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FLIGHT

MAGAZINE

AUGUST 1961

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180-Hp. BRANTLY B-2

(See page 40)

An imperceptible dip of the wing and your plane returns to level flight... a fractional change in direction of flight and it's instantly detected and corrected. Yet—the new Brittain Autopilot is so simple, so revolutionary in design and construction... that it is virtually maintenance-free... installs far more quickly and easily than others ...costs hundreds of dollars less than anything comparable. Reliable? The Brittain Autopilot (Clarkson patent) has been rigorously field-tested by major aircraft manufacturers and private pilots during the past three years: results were so favorable that Brittain Industries, Inc., is able to back every purchase with the most extensive, all-encompassing guarantee in the industry. Two-axis systems (FAA Approved)

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for practically all civilian aircraft, single and twin engine, priced from $795 to $1395... complete... including installation kits. If the revolutionary Brittain Autopilot is not yet available through your local dealer, write direct for free Technical Bulletin. Please state make and model of aircraft and the name of your dealer.

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NOW . . . ADDRESS YOUR SERVICE TO:

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A realistic concept creating America's new community of SPECIALISTS in business aviation service and supply!

Because of the increasingly-complex requirements of modern business aviation – famous name companies, grouped at an already-distinguished location, introduce complete **SPECIALIZATION.**

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THE BEST ADDRESS FOR **SPECIALIZED** *ONE-STOP SERVICE*

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At Southwest Airmotive, Love Field, Dallas, Texas

★ Aero Instrument Service-Sales, Inc.
★ Associated Radio Service Co.
★ Executive Aircraft Service, Inc.
★ Southwest Airmotive Company
★ Universal Weather Service

AIR Report
Significant Trends and News

LIGHTPLANE DELIVERIES DURING FIRST HALF OF 1961 totaled 3,625 units, according to the Utility Airplane Council of the Aerospace Industries Association — 782 fewer than the 4,407 lightplanes delivered during the first half of 1960. Billings by manufacturers totaled $66.8 million, down $19.7 million. . . . **CESSNA AIRCRAFT COMPANY** sales for 9 months ended June 30 were $70.3 million, down from $84.2 million for the same 1960 period. Dwane Wallace, president, said commercial aircraft sales were materially improved during the last 3 months, commenting: "With continued improvement in the economic picture, 1962 is expected to be considerably better than 1961."

SALES LEADERSHIP BY ALL-METAL 4-PLACE MOONEY MARK 21 was claimed from industry sales figures for June showing Mooney sales outnumbered those of any other 4-place lightplane with retractable gear. Mooney deliveries were 28 Mark 21's in June as compared with 25 Beech M35 Bonanzas, 24 Piper 250 Comanches, 15 Cessna 210's, 11 Beech Debonairs and 9 Piper 180 Comanches.

MORE MILITARY BUSINESS FOR CESSNA AIRCRAFT COMPANY last month included a U. S. Army order for 70 L-19E Bird Dog liaison planes and a U. S. Air Force order for additional T-37B jet trainers, seven of which were delivered recently to Peru. . . . **TOUR OF RUSSIA** will be made by a 4-place Cessna Skyhawk as part of a U. S. information "transportation exhibit" to show the Russians how Americans travel.

FIRST DOPPLER VOR RANGE STATIONS have been installed at Marquette, Michigan, and at Rikers Island in New York City. The new Doppler type of VOR can be installed at unfavorable sites without signal interference from nearby objects. . . . **DEVELOPMENT OF LIGHTPLANE RADAR TRANSPONDER WITH AUTOMATIC ALTITUDE REPORTING** is sought by FAA in requesting bids from the industry. It must be mass producible at minimum cost compatible with allowable weight, power drain and power source in small, lightweight aircraft. . . . **NEW AIRCRAFT DISTANCE MEASURING EQUIPMENT (DME)** will be engineered, produced and marketed under an agreement combining the efforts of Wilcox Electric of Kansas City and Hoffman Electronics of Los Angeles. DME system is designated as the Wilcox 833 DME and it will be displayed in October, to be marketed

DO-IT-YOURSELF FAA ADMINISTRATOR JEEB HALABY (right, above) made his first parachute jump on July 7 at the Sport Parachuting Center, Orange, Mass., after taking the standard 3-hr. course. Halaby was Parachutes, Incorporated's 1,155th first-time student. Of 11,774 jumps since 1959, rate of injury has been 3/10th of 1%, without a fatality. Other jumpers in picture, from the left, are Crocker Snow, Massachusetts Aeronautics Commission; Jacques Istel, Parachutes, Inc., president; and Joseph Richardson. —(Parachutes, Inc., Photo.)

FLIGHT MAGAZINE

AUGUST, 1961 VOL. 50, No. 8

THIS MONTH'S COVER shows a 2-pl., 180-hp. Brantly B-2 helicopter performing personal transportation without the need for an airport. Only 24 months after the design as FAA certificated, the 100th B-2 was recently delivered. Non-airport uses predominate in the application of the $19,950 Brantly by purchasers. —(Brantly Photo.)

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New Business in the Hangar—NATIONWIDE ROUNDUP OF INTERESTING DEVELOPMENTS IN BUSINESS FLYING 52

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; E. H. PICKERING, Air Transport Editor; FRED N. STONES, JR., Business Manager; LOUISE ROBERTSON, Circulation; P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas — Telephone TAylor 3-6191.

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First in a complete miniature line!

NEW!

DARE MINIATURE NAV SYSTEM

The First Completely Transistorized Nav Unit

Less than 0.2 amperes total current
5 pounds total weight
Meets TSO and FCC requirements

Here's the entire system for precise Omni-Loc navigation and VHF reception. Two handfuls of dependable transistorized circuitry do the whole job. No external power supplies, no extra black boxes. It's all here with nothing to add.

The DR-480 Receiver... with its fast digital control provides coverage of 480 channels from 108.00 to 131.95 mc. So sensitive, a 5 microvolt signal will produce rated navigation and audio outputs. The standard instrument case is only 10⅝" deep installed behind your instrument panel. Automatic Glide Slope Channeling Control is already included. This receiver is also ideal for ferrying and emergency use, for it can be operated easily from a simple battery pack or any aircraft DC electrical system.

The DNCI-1 Converter-Indicator... is all transistorized in one standard instrument case only 8⅝" deep installed. Full instrumentation to latest military design includes FPDI needles for VOR and GS, Flag Alarms for VOR, LOC and GS, as well as To/From indicator. Maximum bearing error is ± 2°.

Pilots! Aircraft Owners! Win this Nav Unit in Dare's Name the Line Contest

Dare wants a new name for its new, miniature Nav-Comm equipment. The VOR system above is the first of this new line. Other units will offer similar outstanding features of compactness, light weight and low current consumption. Name the line and win one of several valuable prizes. First prize is the system shown above. Write for entry blank to address below or see your Dare distributor. Entries must be postmarked by midnight, August 31, 1961.

DARE INC. - TROY, OHIO

Distributors at Principal Airports

OX5 CLUB OF AMERICA will hold its national reunion August 24-26 in Wichita and Kansas Governor John Anderson, Jr., (seated, above) has proclaimed Aug. 21-27 "Pioneer Airmen Week." With models of OX5 Laird Swallow and OX5 Travel Air, he is shown with Jim Greenwood (center), former Kansas OX5 president, and Arthur Chapman, current president. Governor Anderson welcomed OX5'ers from everywhere to Kansas.

later at a price of between $5,000 and $7,000. Details will be carried next month in FLIGHT MAGAZINE.

"RELIGION AND THE SPACE AGE" is the theme for a 3-day Aerospace Institute for church leaders and college personnel on Sept. 5-7 at Simpson College, Indianola, Iowa. The program study is made possible by a grant from the Iowa Aeronautics Commission, according to announcement by Donald H. Koontz, Simpson College director of aerospace education.

A NEW RAIN REPELLENT for glass or acrylic windshields is mar-

FIRST U. S. DEALER for new Lockheed LASA 60 bush plane is Alaska Airlines, which has also ordered five of the big single-engine Lockheeds for its transport, tour, training and sales operations. C. A. Chapman (left), Lockheed Aircraft International vice president in charge of sales, is shown with Charles F. Willis, Jr., Alaska Airlines president.

Professional pilot **Henry Giere** — flying 26 years, 12 in the USAF (B-17's, 24's, 29's) — flies for Hicks-Ponder Inc., El Paso, Texas, manufacturers of men's and boys' slacks and jeans. With plants also at Del Rio and Yuma, Arizona, and customers all over, a fast business airplane became necessary and a twin-engine Aztec was their logical choice, as it is with so many business firms. Hank Giere tells why:

PIPER AZTEC

"a REAL PLEASURE TO FLY Night or Day... Good Weather or Bad"

c in a wide range of conditions, t sea level to rough, short fields et elevation in New Mexico on

. . . PARAMOUNT"

ompany is of paramount impor- ate the wonderful handling char- tec. Its phenomenal short field capabilities plus its single-engine thing you have to see to believe."

"ICE AT 18,000 FEET . . . NO PROBLEMS"

"Equipped with oxygen we have been to 18,000 feet climbing out of a snowstorm. Picked up a good load of ice on props and surfaces alike. Even with no de-icing equipment or exterior anti-icing applied, we had no difficulty at all, thanks to the Aztec's high-lift wing. She still had plenty of climb left. Carburetor heat handled both engines well."

"65 KNOT SURFACE WINDS...HANDLES NICELY"

"We've landed with surface winds as high as 65 knots . . . the Aztec's a real pleasure when the going is rough. It handles beautifully under all landing conditions."

"ECONOMY MAKES IT POPULAR WITH THE FRONT OFFICE"

"Already our Lycomings have given us 400 hours of trouble-free flying. This economy of operation and low up-keep make the Aztec popular with the front office."

"A REAL EYE-PLEASER"

"The Aztec's beauty and spacious interior make it a real eye-pleaser to clients wherever we go. All in all, the Aztec's a working plane with real utility. Combined with its high cruise and passenger and pilot comfort, it's a real pleasure to fly, night or day, in good weather or bad."

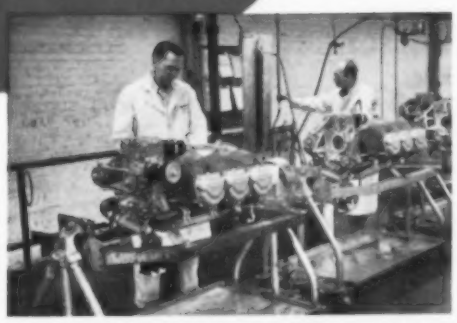
YOU'LL LIKE THE AZTEC, TOO. Holds official round-the-world piston-powered speed record; selected by U.S. Navy for general utility flying. With two Lycoming 250 hp engines, cruises 200 mph, has largest useful load of any plane in its class . . . carries full 144 gallons, (6 to 8 hours), five passengers, complete instrumentation and radio (ADF, 2½ COMM/NAV radio, automatic flight) with 175 pounds weight allowance left over. Tough, rugged, ready to go when you are. Standard model, completely equipped except for radio, only $52,990. See your Piper dealer or write for Aztec catalog, Dept. **F-8.**

LEASE OR FINANCE PLANS

PIPER

AIRCRAFT CORPORATION
Lock Haven, Pennsylvania

The Men and Machines That BUILT Your Engine Originally Are Best Qualified to Restore It to Like-New Condition



THESE FACTORY EXPERTS ARE AT YOUR CALL

Continental's Factory Re-Manufacture Program, successor to the periodic overhaul, backs you with the specialized skills of the men who built your engine—the men who know it best. Neither their experience, nor the precision machines and instruments implementing it, can be matched outside the Continental plant. Continental's Re-Manufacture Program gives you new engine safety and dependability, new engine warranty, new log book with zero engine hours—in a fraction of the time required for overhaul, and at modest predetermined cost. You're back in the air with absolute minimum of down time. Write NOW for the information that can save you important money when overhaul time rolls round again!

ALL CONTINENTAL AIRCRAFT ENGINE MODELS ARE AVAILABLE AS FACTORY RE-MANUFACTURED ENGINES

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION . . . MUSKEGON, MICHIGAN

TREAT FOR STUDENTS of Spartan School of Aeronautics was appearance of Miss Tulsa (Roberta Scott) at a meeting at which former students organized the Spartan Alumni Association. Chester Howard, Spartan flight school director, is pictured with the beauty and a trophy for the former student traveling farthest distance to Tulsa.

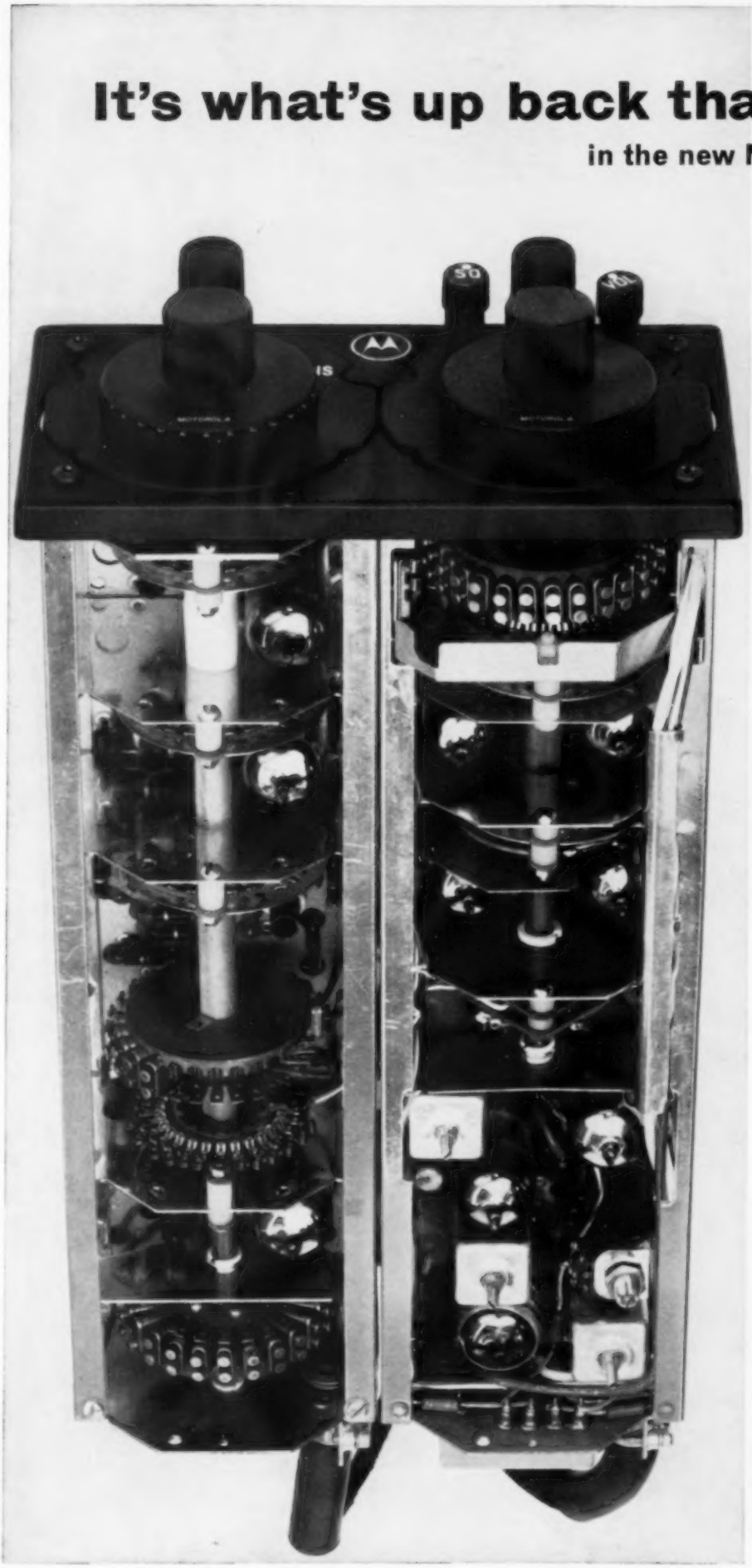
keted by Regal Air Corp., 500 Fifth Ave., New York City, in a kit containing enough repellent, glass cleaner, rinse and tissues for 30 applications on transport-size windshields. Application has been simplified to the point where it is necessary only to wash the windshield and then spread a thin film of the repellent.

AIR-OASIS COMPANY OF LONG BEACH, world's largest private airplane distributor headed by Larry Hunt and distributor for Cessna, has arranged a 5-year $300,000 loan with warrants for purchase of 16% of the stock. The loan was negotiated from Spring Street Capital Co., Los Angeles. Air-Oasis reported sales of $6.4 million for 1960.

J. R. GRAY AIRCRAFT COMPANY OF DALLAS, Beechcraft distributorship, will be headed by D. A. Cody as president and general manager after majority interest in the firm was acquired on August 1 by a group of Dallas business and investment men, including Cody and James

It's what's up back that counts

in the new M-135 NAV/COM system



EVERYTHING NEW BUT THE PANEL:

NEW standard of reliability Designed from the ground up to meet Motorola's rigid specifications for reliability and dependability. Constant environmental testing assures highest quality in every component. **NEW extended frequency range** Available in 360/560 channel configuration (135.95 mc with 50 kc spacing). Or select the standard 90/190 channel model (126.9 mc with 100 kc spacing) and add plug-in crystals and filter later for extended frequency range. **NEW 8-watt transmitter** Boosts output power to a minimum of 8 watts. Delivers clear signal over maximum distance. NEW all-transistorized power supply. **NEW 3-light marker beacon indicator** Mounts vertically or horizontally. Features hi-lo-mute audio control.

NEW add-ability Multi-branch interconnect cable provides for future additions to system with plug-in simplicity. **NEW versatility** Select the NAV/COM system that suits your needs and pocketbook: start with basic communication; then add navigation system with VOR/LOC indicator marker beacon receiver; later add ILS glideslope receiver and cross pointer indicator; complete system with stand-by transmitter.

Your nearby Motorola Dealer will be happy to arrange for a demonstration.

MOTOROLA
Aviation Electronics Inc.

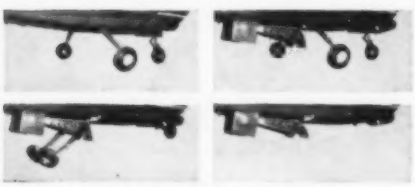
A SUBSIDIARY OF MOTOROLA INC.
10916 W. Washington Blvd., Culver City, Calif.

For many reasons, the advanced Cessna 210 became the world's best-selling high-speed business plane in '60. Now for 1961—five new reasons why you'll prefer the Cessna 210.

See column next page—then your Cessna dealer. At the airport, look for the Cessna pennants, sign of extra Cessna service at over 375 dealers around the world. Here: Cincinnati Air Activities, Inc., Cincinnati, Ohio.

MEN WHO KNOW AIRPLANES FLY CESSNA

BESIDES SPEEDS
UP TO 199 M.P.H....



...AS A RESULT OF
RETRACTABLE LANDING GEAR...

...AND A 260-H.P.
FUEL-INJECTION ENGINE—
THE CESSNA 210 GIVES YOU:

1. **Greater visibility** with an added pair of windows. Panoramic view from all 4 seats.

2. **Larger cabin** with increased head room.

3. **More luxurious interior** with beautiful appointments and adjustable "Polycloud" seats.

4. **Improved cabin comfort** with new "Blend-Temp" heat and fresh air circulating system.

5. **Extra smart styling** with a bold new design in over-all, 2-color paint. You can choose from 8 color combinations.

TAKE A DEMONSTRATION FLIGHT and try the 210's many other features. Call your Cessna dealer now (Yellow Pages). Look at all 12 models . . . starting at $7,495. (210: $23,450.) Also ask about his auto-type finance and lease plans. Or for further information, write: Cessna Aircraft Co., Department FM-11, Wichita, Kansas.

All prices with std. equip., f. a. f. Wichita

CESSNA

12 BUSINESS AIRCRAFT

ADVISORY COMMITTEE ON HELICOPTER OPERATIONAL PROBLEMS, appointed by FAA Administrator N. E. Halaby, is pictured in Washington. Reading clockwise from left are: Fred Milam, Los Angeles Airways; Major J. F. Miller (back to camera), USAF; Maj. F. B. Franklin, Army; T. E. Dumont, Sikorsky; J. Diamond, Boeing-Vertol; Harry Bernard, FAA; Ward N. Masden (hidden), FAA; Col. F. C. Goodwin, FAA; Capt. Howard Higgins, N. Y. Airways; Jack Reeder, NASA; Robert Angstadt, Chicago Airways; Jack Gallagher, N. Y. Airways, and F. W. Brown, Jr., Coast Guard. Lt. Col. P. O. McRobert, Marine Corps, is not shown.

H. Clark, W. Rufus Brent, Ed L. Cox and others. Clark will be board chairman and Spencer Brent will be assistant to the general manager. Cody, long identified with Beech, had been general manager and one of the owners of the firm. J. R. Gray and J. W. Simmons sold their interests to the new owners.

GENERAL MOTORS' NEW LIGHTWEIGHT 250-HP. ALLISON T63 TURBOSHAFT ENGINE, which will power approximately 4,000 of the Army's new light observation helicopters being developed by Bell and Hiller, is undergoing additional engineering and testing. It was designed to exhaust downward but will now be changed to invert the engine for improved installation and maintenance characteristics and to eliminate possible exhaust heat hazards such as grass fires.

BENDIX RADIO'S NEW NVA-22 VOR NAVIGATION SYSTEM incorporates self-checking circuitry making

(Continued on page 50)

Lockheed Building Army's Research Hummingbird

A research VTOL aircraft for the Army, known as Project Hummingbird, is being developed by Lockheed's Georgia Division. As sketched, it will be a 2-place, mid-wing, powered by twin 3,000-lb.-thrust turbojet engines. Span is 25 ft. 8 ins., length 32 feet. High velocity exhaust from jets feeds into system of ejector chamber in fuselage. Flush doors direct exhaust from mixing chambers for vertical or forward thrust. Hummingbird can also hover.

SALUTE!

To Our Teammates on the Supply Line

BROWN AERO CORP., Addison Airport, Dallas, Texas

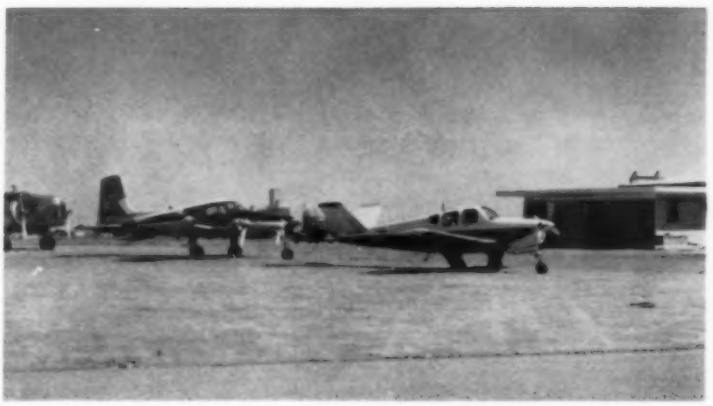
SALUTE! This far-sighted pacesetter was first among the major business airplane distributors to establish a complete sales and service facility on the world's largest privately-owned airport — Addison, on the outskirts of Dallas. Today, Brown Aero maintains more than 150 Aero Commanders in every detail, including electronics, radar, custom radio installations, and complete engine and airframe service. This company is one of the leaders among all Lycoming engine and parts distributors. The management team, which looks to Southwest Airmotive in solving many of its supply problems, is topped by John S. Brown, president, and W. C. White, Jr., vice president-general manager, both widely known for their aggressive selling of Aero Commanders.

CUMMINGS & GROVES AVIATION, INC., International Airport, Houston, Texas

SALUTE! As one of the nation's youngest Piper Aircraft distributors, Cummings & Groves is up and climbing with a versatile organization geared to meet the private and business flyer's every need. The company's sales and service program has the zest of youth, tempered with the skilled and practical touch of its widely-experienced owner — Jack Groves. High respect already has been earned for the Cummings & Groves policy of "service before and after the sale." In addition to Piper, C&G is distributor for Lycoming and for Zep Aero and is a dealer in many blue-ribbon products supplied by its neighbor, Southwest Airmotive-Houston.

McNEILL FLYING SERVICE, Saginaw Airport, Ft. Worth, Texas

SALUTE! Fifty permanently-based aircraft, plus a constant flow of happy transients, testify to the hospitable and diversified services of McNeill Flying Service. This go-getter is located 10 miles NNW of downtown Fort Worth and one mile west of the LF range station, with a 2,650 ft. hard-surfaced NS runway. The facility boasts a main hangar with modern, air-conditioned lounge and offices, plus 32 individual hangar units. Services — supported by supplies from Southwest Airmotive — include minor and major maintenance, exchange engines through 450-hp, 80 and 100 octane fuel, 122.8 unicom, air taxi and rental, and a flight school. Mr. and Mrs. J. D. McNeill are the owners and operators, with Gerald Tidwell in charge of maintenance and Frank Barber the chief pilot and flight instructor.



THE DISTRIBUTION DIVISION

Southwest Airmotive Company

Serving America's Heartland with Flying's Finest Supplies

KANSAS CITY • ST. LOUIS • DALLAS • DENVER • HOUSTON

EDITORIALS

Sales Down — Hopes Up

THE 1960-1961 U. S. economic recession has taken a bite out of utility airplane sales and the forecast is that total deliveries for this year will be down from calendar 1960.

At the mid-year point, sales were picking up perceptibly. One top utility plane manufacturer stated that fourth-quarter sales should be as good as or better than the same period last year. Still another executive was quoted as believing 1961 could yet be one of the best years in lightplane sales history even though it fails to equal 1960 deliveries. The picture is especially bright in the export market with one company announcing a 30 per cent increase so far this year over last.

Most optimistic signs in the lightplane industry are reports of increased utilization of aircraft by present owners reflected in transient business handled by fixed-base operators. While the overall number of active airplanes does not increase materially from year to year, a general up-grading of the American business and private aircraft fleet is taking place and competent industry observers point to this trend as significant in a strong and healthy lightplane market.

Pride of Ownership

IN these presumably ultra-modern days of mass and rapid communications, it is completely anachronistic for so many corporations to try and play down rather than boast about their ownership and use of executive aircraft. Constantly on the search for meaty feature material on the subject of aircraft utilization, the enterprising aviation writer is frequently refused access to material because of "company policy." Top-echelon executives of many companies seem to fear that either their stockholders or the public would not look with favor on their use of business airplanes. As a consequence of this attitude, many a good story goes unpublished.

Since aircraft utilization is more than adequately justified by the corporate executives who buy and use them, then why should there be any stigma to ownership or reluctance to talk about it? Upon what factors is such a fear based? Perhaps one of the causes of this unfortunate situation is that business airplanes for many years have been referred to by mass media as "flying yachts." The business airplane industry has done little, if anything, to break down this erroneous comparison.

As a matter of fact about 300 of our 1,000 largest domestic corporations own and use business airplanes. Such ownership would appear to be synonymous with both success and growth. The most progressive and successful business enterprises in the United States all specify air travel and many of them own more than one company airplane.

Airplane ownership should be a symbol of efficiency and success — a mark of modernity and progressiveness; in short, something to brag about. Perhaps the industry needs to do some spadework in rooting out the stigma of airplane ownership, which is cropping up all too frequently these days to be passed off as "unusual cases."

Our Do-It-Yourself Administrator

WE seriously doubt if there has ever been a Federal administrator in any post to match the active personal participation in affairs and cover as many bases as does Najeeb Halaby, our FAA Administrator.

"Jeeb" has been in office less than 100 days. His itinerary, his public appearances and his personal investigations of larger problems since his appointment are staggering.

One day you hear about him flying the modified Lockheed Electra II and the very next day he's at the controls of Convair's supersonic B-58 bomber. Just recently he made his first parachute jump — to find out for himself what the sky-divers are up to. The following week he was in Denver, personally investigating a tragic jet transport accident. In between these more spectacular activities you will find him making speeches, attending all the high official aviation functions and holding meetings with a variety of aviation groups in addition to his own staff work in Washington.

Halaby reveals an interesting mixture of attributes found in Marco Polo, Fiorello LaGuardia and Chauncey Depew. We're lucky to have a man of his talents at the helm of our Federal agency, mainly because the sharpies, both in and out of government, had better know what they are talking about when they tie into this capable and energetic Administrator.

Now There's A Bomber Gap

EVEN more deplorable than the missile gap is America's apparent loss of leadership to Russia in manned, supersonic heavy bombers. Formations of big delta-winged Russian bombers were pictured over Moscow last month. In sharp contrast, the United States Air Force continues to rely on subsonic B-52's.

We're running behind in both the missile and the supersonic bomber races. This is the logical consequence of the old American custom of making air power a political football. For example, the Mach 3 B-70 has been ordered, cancelled, re-instated and cut back whenever the politicians found those moves convenient and in complete disregard of vital military needs.

The missile gap was bad enough. Now comes the shocking bomber gap. Unless all-out efforts are ordered to regain U. S. leadership in the skies, the Russian peril will multiply.Immediate B-58 orders and restoration of B-70 cutbacks are demanded. We also believe the peril justifies B-70 production by-passing prototype delays.

Good News From Mexico

A GROUP of executive pilots in Mexico have banded together in the Club de Aviadores Executivos, which holds considerable promise of increasing the flow of private aircraft travel between Mexico and the United States. While most of their activities will concern internal aviation affairs, we have been told that the encouragement of tourist air travel between our two countries will be one of their major interests.

The new club hopes to accomplish this worthy objective by improving communications and by a broader distribution of facts and information, so that flying in Mexico will be made easy and simple for all kinds of transient pilots.

For many years our editorial staff members have flown all over Mexico and have never had any trouble — because we always tried to follow Mexican rules and systems, which are in some respects different from our rules and systems. American pilots who experience difficulties in Mexico are usually of two types. First, they don't take the time to find out what the Mexican authorities require, what the RAMSA system of paid radio communications involves and some simple customs that differ from the way we do business in this country. The other type is the kind who has trouble everywhere they go — if others don't do it like they do in the U. S., everyone else is out of step. The latter type is looking for trouble and always finds it. There's not much anybody can do for these characters except to dissuade them from ever leaving our borders.

One of the first projects to be undertaken by the newly formed club in Mexico is to establish a VHF Unicom system similar to our U. S. system. At the present time, Mexican pilots talk to each other in the air on 119.1, which is monitored constantly, looking for mutual assistance opportunities and information in the way of pilot reports. All towers in Mexico guard 118.1 and the network of low frequency radio range stations is excellent.

Pilots desiring more information on flying in Mexico should direct their communications to the club president, Gilberto Vallecillos, Ave. Hangares No. 149, Mexico, D. F. (We suggest the use of air mail).

Reading the Russians' Hand

LAST month a Soviet-built Czechoslovak airliner crashed on landing near Casablanca, Morocco. The news dispatches covering this accident, which killed all 72 persons aboard, revealed what the commies are up to in Africa. Several Russian flying instructors were aboard the airplane, headed for Guinea and Ghana to train Negro air crews. The second item of interest was that the plane's cargo included "communist documentary films and pamphlets for African distribution."

While we sit on our hands and shudder every time the Kremlin rattles the sword over Laos, Cuba or West Berlin, the commies are quietly infiltrating the uncommitted nations of the world by people and by propaganda. We spend billions for foreign aid and get little more than hatred and criticism in return. The communist printing presses are flooding the world with their fancy magazines, literature and information. Our information services operate on a mere pittance. Even Radio Free Europe has to depend on private contributions in order to survive.

The Soviets are busily engaged establishing little technical beachheads all over the globe. The airplane is one of their implements. Here is one area in which we can beat them at their own game — establish our own training units abroad and provide useful services sorely needed by under-developed countries. Small airplanes and helicopters leave nothing to be desired in the matter of direct aid that can be seen and recognized as American assistance — not only in communications and transportation, which are sorely needed, but in agricultural applications to increase domestic crop production. Once established, we might even develop future markets for our aircraft — and it wouldn't break the American taxpayer in providing this kind of foreign aid.

Business doesn't wait for sunny days...

There's no need to delay important trips when you fly Aero Commander. Take off today and fly over-the-weather in pressurized comfort.* The Aero Commander carries a full complement of electronic communication and navigation equipment for IFR operation, even radar. You'll find Aero Commander more profitable because it's capable of full-time utilization. Take off today in the stable, dependable Aero Commander.

**Cabin pressurization available on model 680F.*

AERO COMMANDER *offers the best combination of features essential to business flying.*

AERO COMMANDER, INC, Bethany, Oklahoma • Subsidiary of ROCKWELL-STANDARD CORPORATION

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TACTAIR-QUALITY
AUTOPILOT
for only
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T-101

Holds a straight course PERFECTLY · Makes turns AUTOMATICALLY

Operates the famous Tactair way...
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Weighs only 4 pounds; uses no electric current.
Easily installed in all popular single-engine types.
See your nearest Tactair distributor
or write for T-101 brochure.

TACTAIR
INCORPORATED
BRIDGEPORT, PENNSYLVANIA

LOWEST INITIAL COST • LOWEST OPERATING COST • 180 MPH CRUISE • NO. 1 IN SALES

#1 first in June sales for retractables!

OFFICIAL AIRCRAFT SALES (A.I.A.)						
aircraft model*	MOONEY MARK 21	COMANCHE 180	COMANCHE 250	BEECH DEBONAIR	CESSNA 210	BEECH BONANZA
June sales	28	9	24	11	15	25

*listed in order of advertised price

In just six months, since the introduction of the sleek, all metal MOONEY MARK 21, it has gained the number one spot in sales for all retractable-geared models. More and more people are discovering Mooney's high speed performance (180 mph cruise), and low operating cost. See the new all metal Mark 21 — lowest in intial cost, lowest in operating cost, and No. 1 in sales! • Write for the Mooney Comparison File and prove to yourself — why Mooney's the best buy!

Mooney has accomplished this outstanding sales record with more than 50% of the available sales territory open. The Mark 21 is only the first of a series of outstanding models "on the way"! Are you overlooking an opportunity?

MOONEY *Aircraft Inc.* • *Kerrville, Texas*

NEW! 8 OUNCE *Glideslope* RECEIVER is built-in the KING KX-110 COMM/VOR/ILS PACKAGE

10 WATT TRANSMITTER—3 RECEIVERS

This new addition to the *King Plan for Radio System Progression* adds ILS utility to the King KX-100 System without adding to space requirements. The entire unit is panel mounted (6½" x 5¼" face plate) and weighs only 9 pounds including a separately mounted, transistorized power supply (14V or 28V). You get all this for only **$1495.** (14V)

COMM — 90 channel crystal controlled Transceiver (118.0 to 126.9 mc inclusive), *all the channels you will ever need to operate in any terminal area* in the U.S. 10 watt transmitter power with receiver sensitivity to match.

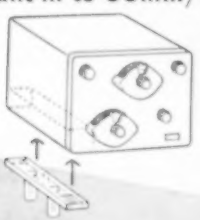
VOR — 100 crystal controlled channels (108-117.9 mc) covers all omni and localizer channels. Separately tuned for *simultaneous* use with COMM Transceiver.

ILS — *Glideslope receiver is built-in.* 10 crystal controlled Glideslope frequencies are paired with localizer frequencies for automatic tuning.

EASY INSTALLATION! The KX-110 is the simplest and easiest to install of all COMM/VOR/ILS packages. (Almost plug-in, if you now have a KX-100.)

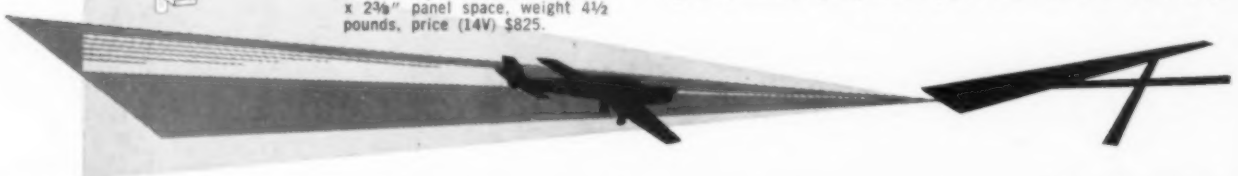
The Only Glideslope receiver that is —

- Panel Mounted!
- Only ½ pound in weight!
- Built-in to COMM/VOR/ILS package!



KN-50 VOR/ILS PACKAGE

All omni and localizer channels **plus 10 channel Glideslope receiver.** Crystal controlled. 6½" x 2⅜" panel space, weight 4½ pounds, price (14V) $825.



And a Matching
Omni
Localizer
Glideslope
Converter
Indicator

The KING KI-210

Airline accuracy, reliability. Paired with the King KX-110 or KN50, gives you exceptional reception range on omni; switches automatically to localizer *and* Glideslope when the correct localizer frequency is tuned. Your instrument breakthroughs will be perfect centerline . . . missed approaches are obsolete with the KX-110/KI-210 System.

Size—Standard Instrument 3¼" x 3¼", 10" deep.

Weight—only 2½ pounds.

Price—only $995.00.

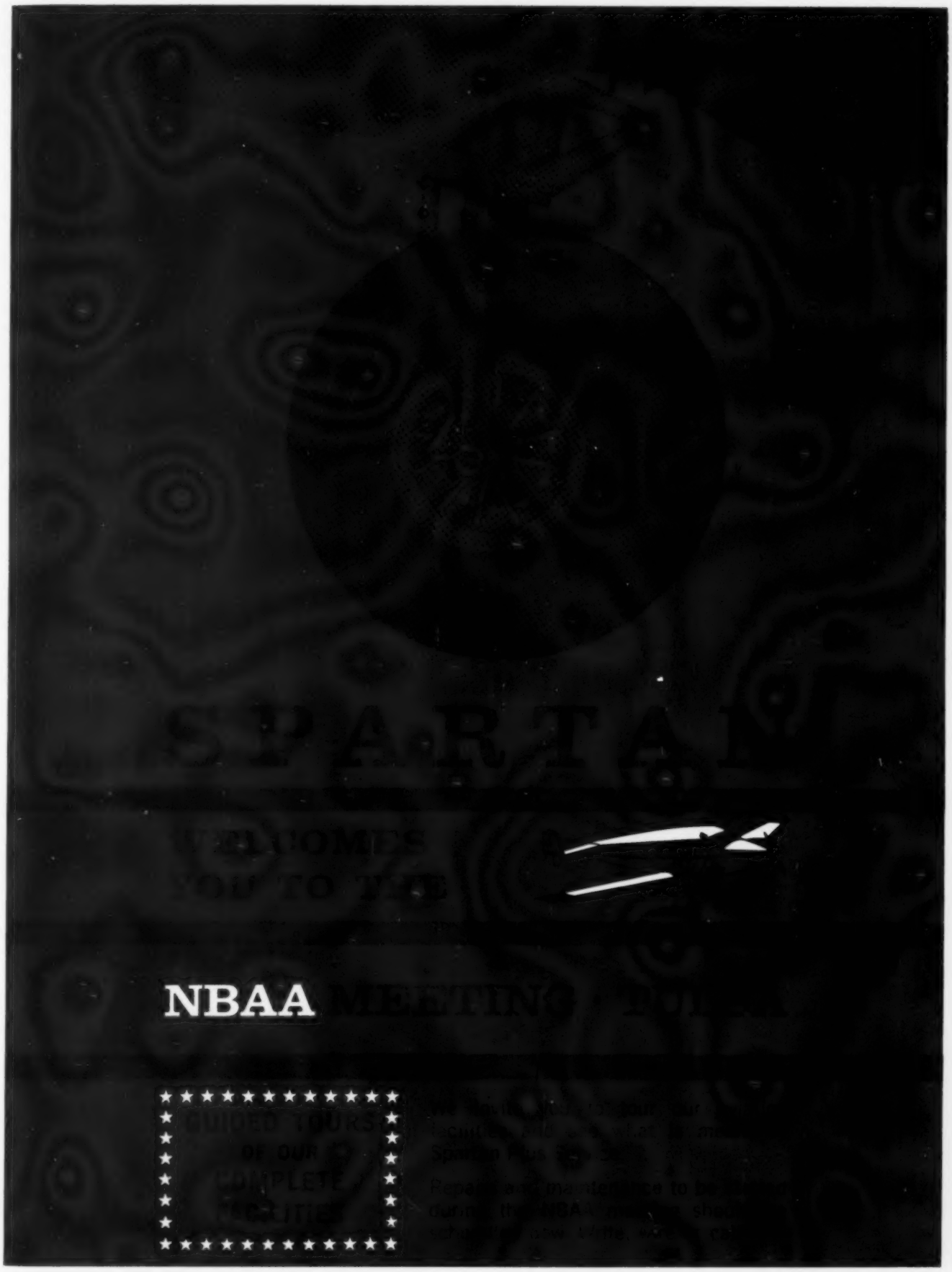
KING

For *complete* information and demonstration of the King KX-110 and KI-210 see your King Dealer. Write direct to King Radio Corp., if you do not know his name and location. Ask also about the new KN-50 NAV Receiver with built-in Glideslope receiver.

KING RADIO CORP.
OLATHE, KANSAS

Sold and installed by Certified Dealers in U.S. and Canada. Export by REA International, 80 Broad Street, N. Y.

Builders of TOMORROW'S Aircraft Equipment TODAY!



AVIATION SERVICE DIVISION
sparlan AIRCRAFT COMPANY / TEmple 5-4491 / Municipal Airport / Tulsa, Oklahoma

Big Super G18 cockpit gives you room to work, plus space for lots of extra nav/com equipment and radar.

Big separate passenger compartment has new panoramic windows, center aisle, can seat 7 to 9 people.

With its big, dependable 450 hp Pratt & Whitney engines, the Super G18 gives you speeds to 233 mph. Optimum range, with reserve, is over 1,450 miles. Radar can be easily installed in the Super G18's nose.

Beechcraft Super G18...Why Settle For Less?

Today there is still only one twin-engine executive transport that can carry so many people so far, at such high speeds, and with so much roominess, comfort and privacy at such low operating costs.

That airplane, of course, is the world-renowned Beechcraft Super G18, a favorite of pilots everywhere.

Why settle for less—especially when you consider the advantages of Super G18 ownership, including:

1. The Super G18 is a big airplane, built to do a big job, with 3,790 pounds useful load allowance for passengers, baggage, fuel and equipment.

2. Compartmented privacy for pilots and passengers alike. Seating arrangements for 7 to 9 people. Wide selection of optional appointments, including food bar, work tables and other "office aloft" equipment, plus a completely private lavatory.

3. Big inside baggage compartment. Air-stair door.

4. All-weather usefulness with modern weather radar and a wide choice of factory-installed radio and navigation equipment, plus de-icing equipment.

5. Rugged durability for built-in extra years of service with minimum maintenance costs.

6. Lower operating costs than any other aircraft that can do the big jobs the Super G18 can do.

If you want the best, why settle for less? See your Beechcraft distributor or dealer for a Super G18 demonstration soon.

Write today for latest information on low-cost Beech leasing and financing plans. Address: Beech Acceptance Corp., Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Put yourself here soon and discover why the Twin-Bonanza is the favorite of so many professional pilots. Note full dual flight controls and instruments, central location of engine instruments and radios.

Roomy Twin-Bonanza cabin seats 6 in typical Beechcraft comfort. Luggage is quickly accessible in flight.

The strongest, most ruggedly built airplane in commercial aviation, the Twin-Bonanza goes into and out of any field with ease, quickly tops terrain and most weather. Your choice of two proven Lycoming power plants.

What The Beechcraft Twin-Bonanza's Extra Strength And Reliability Mean To You These 3 Ways:

1. **More "take it anywhere" utility:** You don't have to pamper it. With its great structural strength, rugged wide-tread landing gear and high ground clearance, the Twin-Bonanza is as much at home on unimproved fields as it is on smooth paved runways.

2. **Greater safety:** The superior structural strength of the Twin-Bonanza (designed and tested to withstand in-flight loads equal to almost 7 times its own weight) gives you higher safe turbulent air penetration speeds than competitive aircraft.

3. **More flying hours, fewer maintenance hours:** Because the Twin-Bonanza is built to absorb more punishment than other airplanes, you can count on less down-time for maintenance and repairs.

But that's not all . . .

The Twin-Bonanza also offers you a big, comfortable cabin with center aisle, individual seating for 6, super-soundproofing, roomy baggage compartment accessible in flight, plus air-stair door for safe, easy entry and exit in any weather.

Visibility is excellent, for pilots and passengers alike. The big 50,000 BTU heating system keeps the cabin comfortably warm in any climate at any altitude. Optional appointments include work tables and couches. Aft-facing seats also available.

You owe it to yourself . . .

Before you buy any airplane of 6,300 to 8,000 pounds gross weight, you owe it to yourself and your company to see, fly, and get all the facts about the new Beechcraft Twin-Bonanza. Why not see your Beechcraft distributor or dealer soon?

Write today for latest information on low-cost Beech leasing and financing plans. Address: Beech Acceptance Corp., Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

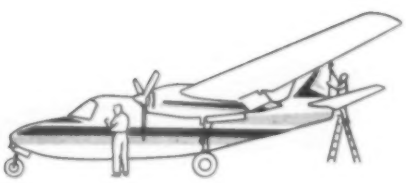
NOW!
A complete factory-new

8

PAINT JOB IN DAYS

. . . anything from a "puddle jumper" to a "DC-3"

Downtown Airpark expands paint facilities to cut down "down-time"



Downtown Airpark does the original factory paint work on the Aero Commander

Expanded facilities and increased personnel now enable Downtown Airpark to complete a factory-new paint job on most airplanes in eight days or less. This reduction in "down-time" effects even greater savings for Airpark paint customers.

- NO ADVANCE IN PRICES
- NO COMPROMISE WITH QUALITY
- JUST BETTER PAINT JOBS AT PRACTICAL PRICES IN LESS "DOWN-TIME"

Why not phone or write today and set a date for painting your airplane?

phone before you buy

DOWNTOWN Airpark INCORPORATED

1701 S. WESTERN • OKLAHOMA CITY, OKLAHOMA

FAA APPROVED REPAIR STATION NO. 2034 FOR MODIFICATION OVERHAUL AND REPAIR
COMPLETE PARTS DEPARTMENT • OKLAHOMA DISTRIBUTOR FOR AERO COMMANDER AND LYCOMING AND CONTINENTAL ENGINES

What's happening to 91/96 octane aviation gasoline?

More and more, pilots and owners wonder why they see less and less 91/96 octane gasoline. The day's not too far off when you won't see it at all. Here are a few of the many reasons why:

ENGINE MANUFACTURERS aren't planning any new models calling for 91/96 octane avgas. All new engines are being rated on 100/130 grade. This way, the manufacturer increases power output for the same size engine and you get more power and performance. When the avgas dealer doesn't stock 91/96, the manufacturers recommend you use 100/130 grade in their present engines rated on 91/96 octane.

AIRPORT OPERATORS are finding the resulting decreased demand for the 91/96 grade advantageous. Without 91/96 they're able to carry fewer grades of gasoline, cut inventory, and have less money tied up in stock. This lessens operating complexities and has but one disadvantage: 100/130 meets occasional buyer resistance at airports where it costs more than the 91/96.

WHAT ABOUT YOU? Remember, *any engine whose specs call for 91/96 can use 100/130 without fear of damage*. That's important, and it's backed up by reliable statistics. True, 100/130 may contain more tetraethyl lead than 91/96 and, in such cases, better spark plug maintenance might be required. But, the prop-wash about it burning up valves and causing other internal damage in lower rated engines is an old wives' tale.

If your engine is rated on 91/96 octane aviation gas, don't ever be afraid to step up to 100/130. Never, *under any circumstances*, downgrade your fuel. The consequences are detonation, a burned piston, and a dead engine.

When you land near the sign of the orange disc, it's a short taxi run to aviation's finest family of fuels and lubricants. Gulf Aviation Gasoline, in all grades, is filtered, cleaned and purified, from storage to wing tank. Your Gulf dealer also sells Gulf Aircraft Engine Oils for those who prefer straight mineral oil and Gulfpride-Aviation Series D, when you want a detergent oil. For top performance and dependability, fly Gulf.

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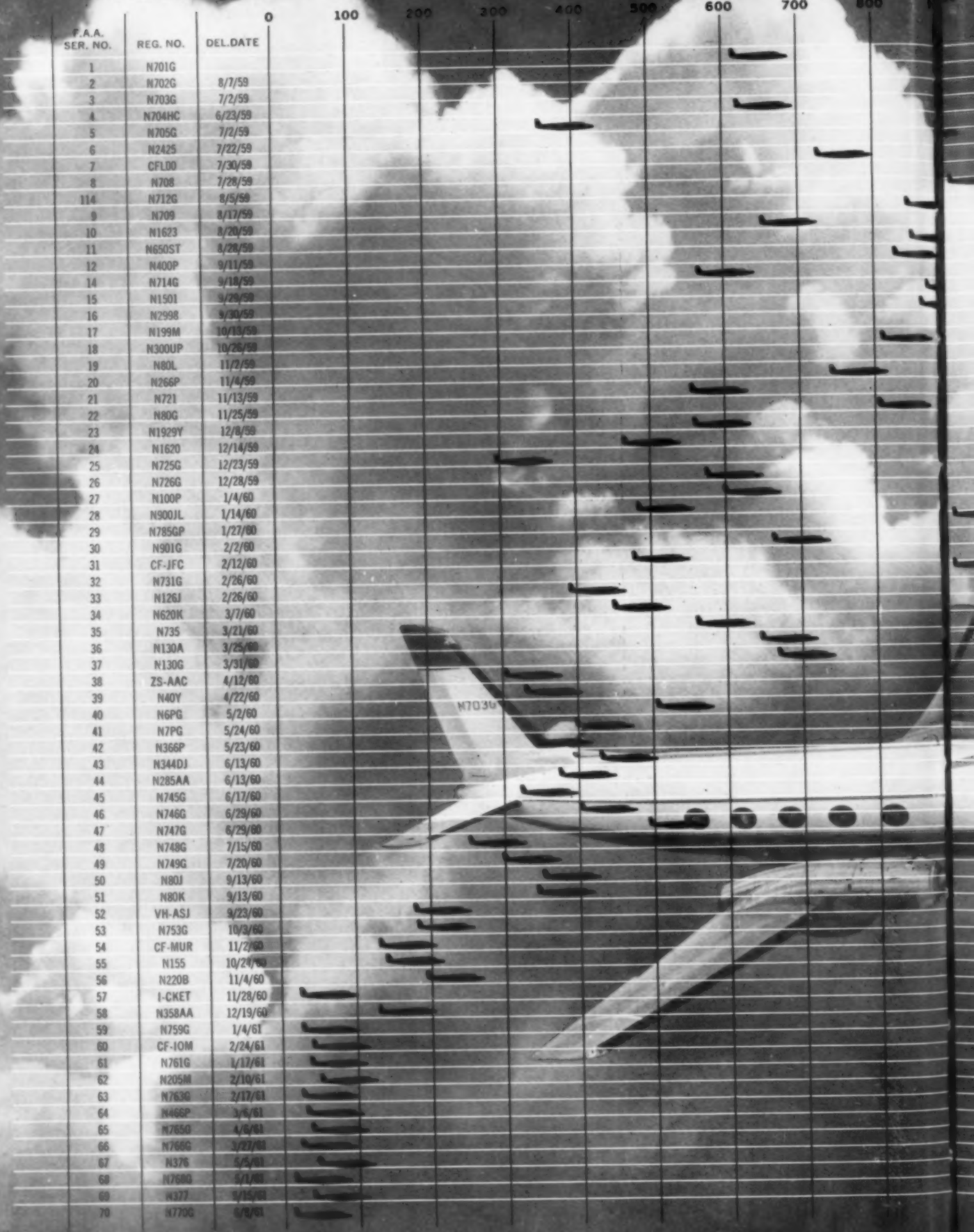
AVIATION PRODUCTS

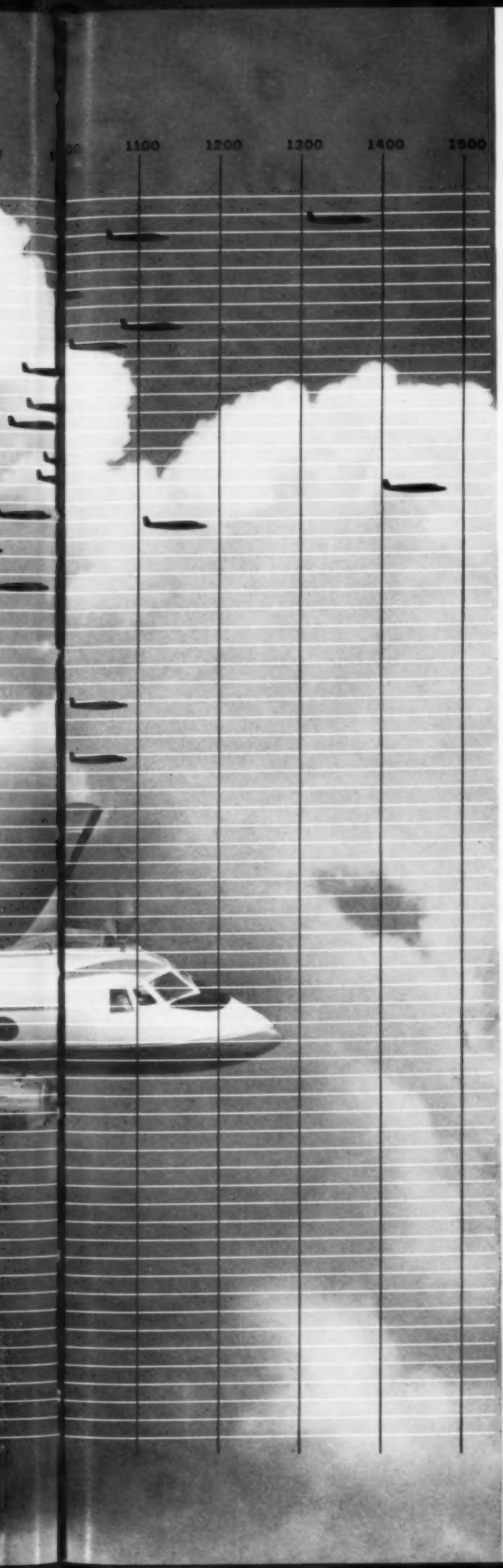
GULF OIL CORPORATION

FLYING HOURS SINCE F.A.A. CERTIFICATION.



F.A.A. SER. NO.	REG. NO.	DEL. DATE
1	N701G	
2	N702G	8/7/59
3	N703G	7/2/59
4	N704HC	6/23/59
5	N705G	7/2/59
6	N2425	7/22/59
7	CFLDO	7/30/59
8	N708	7/28/59
114	N712G	8/5/59
9	N709	8/17/59
10	N1623	8/20/59
11	N650ST	8/28/59
12	N400P	9/11/59
14	N714G	9/18/59
15	N1501	9/29/59
16	N2998	9/30/59
17	N199M	10/13/59
18	N300UP	10/26/59
19	N80L	11/2/59
20	N266P	11/4/59
21	N721	11/13/59
22	N80G	11/25/59
23	N1929Y	12/8/59
24	N1620	12/14/59
25	N725G	12/23/59
26	N726G	12/28/59
27	N100P	1/4/60
28	N900JL	1/14/60
29	N785GP	1/27/60
30	N901G	2/2/60
31	CF-JFC	2/12/60
32	N731G	2/26/60
33	N126J	2/26/60
34	N620K	3/7/60
35	N735	3/21/60
36	N130A	3/25/60
37	N130G	3/31/60
38	ZS-AAC	4/12/60
39	N40Y	4/22/60
40	N6PG	5/2/60
41	N7PG	5/24/60
42	N366P	5/23/60
43	N344DJ	6/13/60
44	N285AA	6/13/60
45	N745G	6/17/60
46	N746G	6/29/60
47	N747G	6/29/60
48	N748G	7/15/60
49	N749G	7/20/60
50	N80J	9/13/60
51	N80K	9/13/60
52	VH-ASJ	9/23/60
53	N753G	10/3/60
54	CF-MUR	11/2/60
55	N155	10/24/60
56	N220B	11/4/60
57	I-CKET	11/28/60
58	N358AA	12/19/60
59	N759G	1/4/61
60	CF-IOM	2/24/61
61	N761G	1/17/61
62	N205M	2/10/61
63	N763G	2/17/61
64	N466P	3/6/61
65	N765G	4/6/61
66	N766G	3/27/61
67	N376	5/5/61
68	N768G	5/1/61
69	N377	5/15/61
70	N770G	6/8/61

Shown above: actual recorded flight time on Gulfstream aircraft—May 1959 to July 1961.



Grumman Gulfstreams set outstanding utilization records! Fly 68 million passenger miles since May 1959

One Gulfstream, owned by George W. Crothers Limited, traveled 171,000 passenger miles in just one week!

68 million passenger miles! 35,000 flying hours! *All* in just 26 months, from F.A.A. certification in May 1959 to July 1961....

This is aircraft utilization at its best . . . aircraft utilization that only a Gulfstream can deliver. For it is the only aircraft in its class designed exclusively as a business airplane!

The result: the Gulfstream offers unique flight and ground flexibility. It's the most do-everything business airplane there is—one of the most useful *and* usable business airplanes in the world!

For a good example of this, just consider the experience of George W. Crothers Limited of Toronto, Ont. This company's Gulfstream traveled 171,000 passenger miles in just seven days!

Starting on a Sunday and for seven consecutive days on a daily basis—the Crothers' Gulfstream ran scheduled trips between Toronto and Tampa, Florida. The purpose of these trips was to airlift top Canadian customers to Tampa for demonstrations of a new line of tractors handled by Crothers Limited.

The seven-day Crothers flight log tells the Gulfstream utilization story with dramatic detail.

	DEPARTED	ARRIVED	DEPARTED	ARRIVED
Sunday	Toronto 07:57 Ft. Lauderdale 14:20	Tampa 12:04 Toronto 18:25	Tampa 12:42	Ft. Lauderdale 13:35
Monday	Toronto 08:10	Tampa 11:28	Tampa 13:08	Toronto 17:06
Tuesday	Toronto 08:24	Tampa 11:45	Tampa 12:47	Toronto 16:44
Wednesday	Toronto 07:52	Tampa 11:29	Tampa 12:50	Toronto 16:34
Thursday	Toronto 07:57	Tampa 11:42	Tampa 12:53	Toronto 16:27
Friday	Toronto 07:59	Tampa 12:25	Tampa 13:26	Toronto 16:52
Saturday	Toronto 07:34	Tampa 11:05	Tampa 12:37	Toronto 16:27

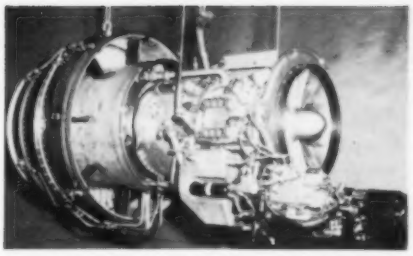
Flight performance like this—performance that makes the Gulfstream ideal for 71-mile or 7100-mile trips—is one reason why 70 Gulfstreams are now in operation. Other reasons are Gulfstream's proven safety, reliability, comfort and beauty. It's a sound investment.

Corporate executives and pilots may arrange for demonstration flights through the following distributors. In the United States: Atlantic Aviation, Wilmington, Del.; Pacific Airmotive, Santa Monica, Cal.; Southwest Airmotive, Dallas, Tex. In Canada: Timmins Aviation, Montreal. In Europe: Atlantic Aviation Export Corporation, London, England.

GRUMMAN

AIRCRAFT ENGINEERING CORPORATION

Bethpage • Long Island • New York



Turbofan Twin of 8 to 12-place size (left) will be powered by General Electric's efficient CF700-2B Turbofan (above), which is the basic CJ610 engine plus an aft fan. Rated at 4,200 lbs. thrust, its specific fuel consumption is .69 lbs. per lb. of thrust.

Jet Trends and Business Aircraft

By L. V. TOMASETTI
Small Aircraft Engine Dept., General Electric Co.

THE year 1961 is a significant anniversary for U. S. aviation. Twenty years ago the first U. S. jet engine was assembled at General Electric's Lynn (Massachusetts) plant. It was the Model I-A and it produced 1,300 lbs. of thrust, weighed 780 lbs. and first flew in the pioneering Bell XP-59A, launching the Jet Age in America.

Progress in jet engine development was rapid. The military need for greater speed and altitude capability provided the catalyst. The original GE I-A turbojet was followed by the GE I-40, which later became known as the J-33 in the Lockheed P-80 "Shooting Star."

The ever-urgent quest for air superiority saw military aircraft move from subsonic to transsonic and finally supersonic flight regimes. As a nation we became accustomed to the speed and reliability which are synonymous with gas turbine power.

By the mid-1950's the commercial airlines, as well as the aircraft and engine companies, had decided that gas

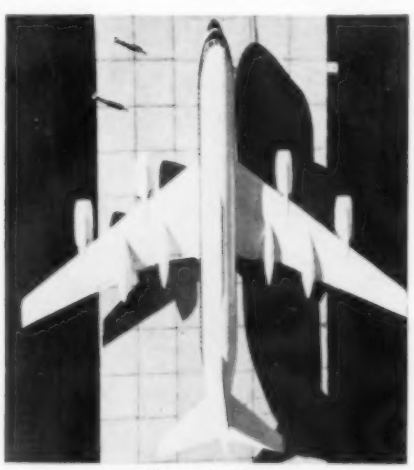
General Electric I-A Jet

Bell XP-59A

Lockheed P-80

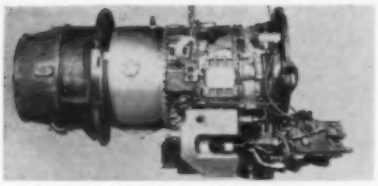
General Electric J33

Convair 880



Convair 990

These big Convair 880 and 990 airliners of the 1960's and their GE CJ805-3 and CJ805-23 engines are a direct outgrowth of the pioneering military jets of the 1940's — the Bell XP-59A and its GE I-A jet and the Lockheed P-80 and its GE J33 jet shown above.



This General Electric CJ610 jet is available in two versions. The CJ610-1, rated at 2,850 lbs. of thrust for take-off and 2,700 lbs. for maximum continuous operation, powers the new Jet Commander (right). The CJ610-2B version, rated at 2,400 lbs. maximum continuous, powers William P. Lear's SAAC-23 Execujet (right).

Jet Commander

SAAC-23 Execujet

New GE Jets Compared

	CJ610-2B	CJ610-1	CF700-2B
Take-Off Thrust, lbs.	No Rating	2,850	4,200
Max. Continuous Thrust, lbs.	2,400	2,700	4,000
SFC, lbs. per lb. hr.	.91	.99	.69
Weight, lbs.	355	355	640
Thrust to Wt. Ratio	6.7:1	8:1	6.5:1
Diameter, ins.	17.7	17.7	18-34
Length, ins.	40.5	40.5	65

turbine-powered aircraft had proved themselves ready for commercial service. The public heartily endorsed their decision and soon business and pleasure travelers were enjoying 500-600-mph. travel with comfort and safety. One after another, turbine jetliners were introduced into scheduled service — Boeing's 707, Douglas DC-8's and Convair 880's.

Soon the Convair 990's and Caravelles will join the U. S. jetliner fleets. Along with the introduction of the $3-6 million large jetliners came smaller jet-powered transports intended for military and executive use, such as the Lockheed JetStar and North American Sabreliner. These turbine aircraft are approximately in the million-dollar class.

Now, in the early 1960's, the country is ready for jet-powered business and executive aircraft. What makes this possible is the fact that small, proven gas turbines are ready and available. Other factors which have accelerated the growing trend to gas turbines are:

1. A new concept of performance. It offers over-the-weather flight, less time in the air and more productive time at your destination for business or pleasure.

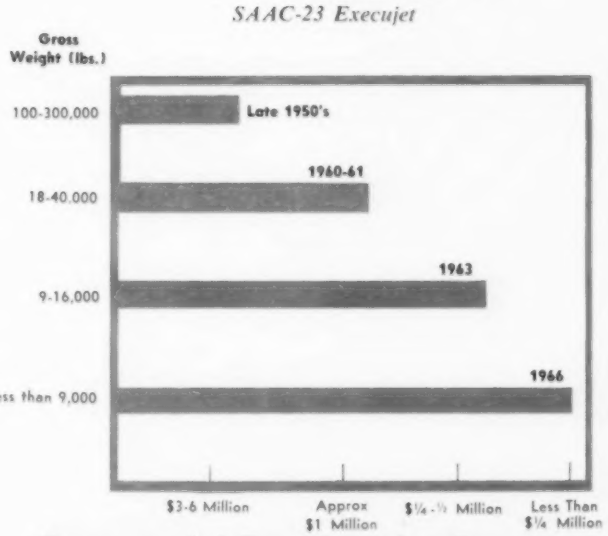
2. Greater inherent reliability with gas turbines — proven by airline records and stemming from simplicity of engine design.

3. Greater comfort than ever before. This makes possible vibration-free, smoother flight, lower cabin noise levels and less flight fatigue.

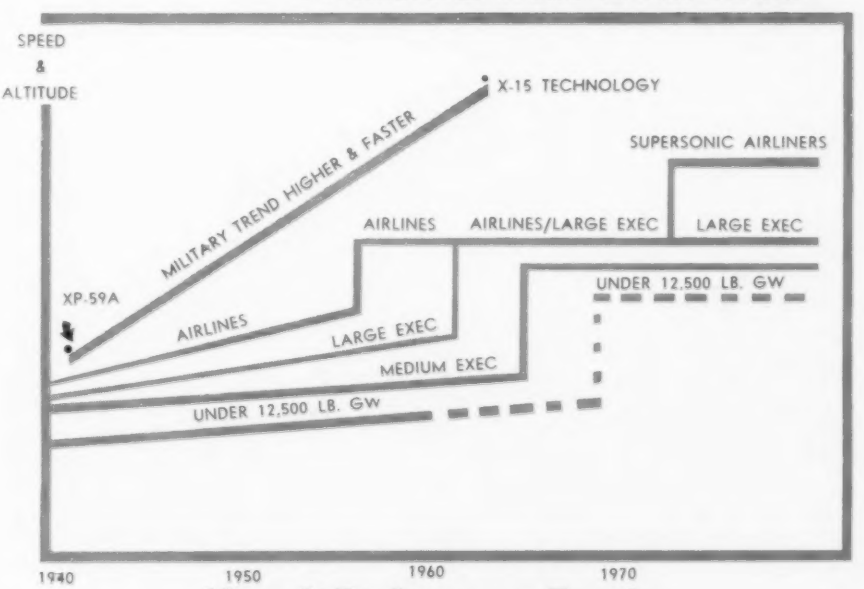
But it bears repeating that the single, most important factor which has precipitated the turbine trend is the availability of proven gas turbine power plants. Today, General Electric, which led America into the Jet Age in 1941 with the I-A, has developed at the same Lynn plant a "family" of turbine engines specifically for the business and executive aircraft market. This family includes the following engines:

The CJ610-1 Turbojet. Of 2,850 lbs. of thrust, this engine has been selected by Aero Commander, Inc. to power its Model 1121 6-8-place, 500-mph. twin-jet Commander for busi-

(Continued on page 57)



Commercial Trend to Jet Power



Aircraft Performance Trends

Cities Too Small For DC-3 Could Use Service by Light Twins Feeding Larger Terminals

Needed: A Third Level Of Air Service

PART I

By E. H. PICKERING

THE trunk airlines are moving toward all-jet operations and are trimming their route systems of many smaller cities that cannot economically justify jet service. The local service airlines are growing in stature, taking over the cast-off cities of the trunks, moving into short-haul trunk markets, and, in turn, sloughing off many of their own smaller cities. Does this changing pattern leave an opening for a "third level" of airline service in this country? The question needs exploring.

More than 200 cities, which the Civil Aeronautics Board found deserving of local airline service during the last 15 years, have either been abandoned by these airlines, or are facing the loss of their service because of the CAB's use-it-or-lose-it policy. Under this policy, cities are required to generate an average of five boarding passengers a day or face loss of their service. The 1960 figures show that, out of 461 points served by the locals, 123 failed to make the five-a-day average.

Did the CAB err in certificating service to these cities? Or have operating costs of the local service airlines crept so high that mounting subsidies are forcing the CAB to this action? Probably the latter. If the CAB was right in finding that these cities needed airline service for their economic well being, then the same situation in most cases still exists, and may well be even more justified with the passing years.

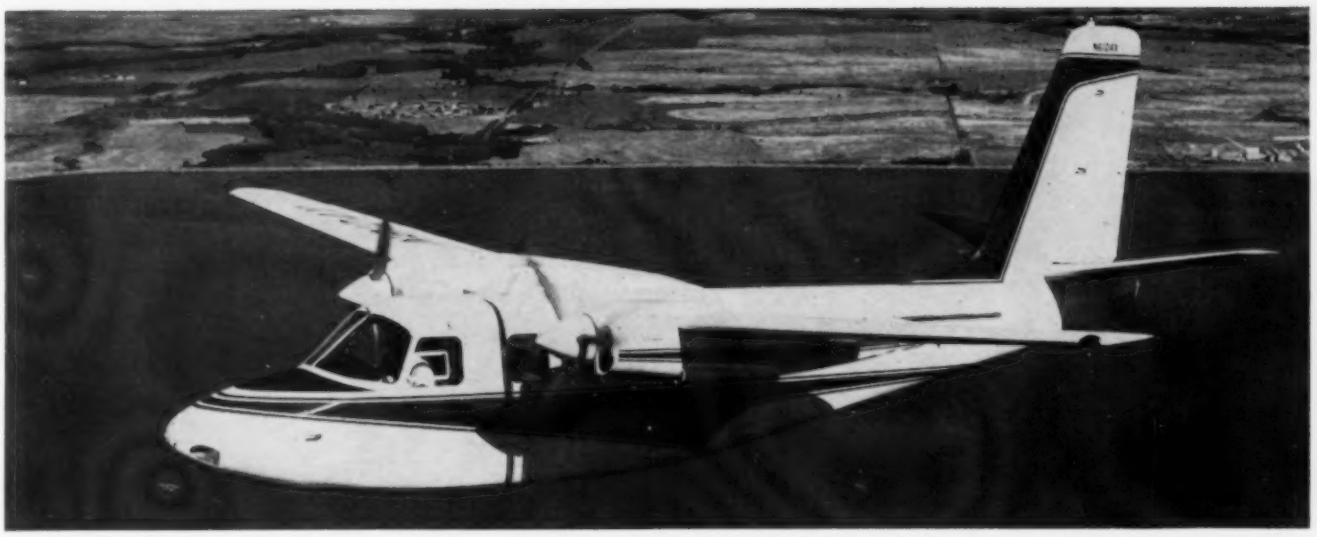
The underlying cause of eliminating service to smaller points, however, is the inability of the DC-3 aircraft (smallest craft in use by the locals) to operate at an economic level that is reasonable in order to provide the service.

Actually, the fault lies not with the DC-3, but with the route structures over which it is scheduled. This is a fine point, but a very important one. The DC-3, with a capacity of from 21 to 28 passengers, is too large to be used to serve *only* small traffic generating points.

Most of the points that have lost or will soon lose their airline service were reduced to service on a single daily round trip, on which basis they are judged. It is true that many would not have reached the five-a-day average even with more service. It is also true that the service that they did receive was generally timed to meet the greater needs of larger cities, and the service to these losing cities was a secondary consideration.

Miniature transports available for third-level of scheduled air service include 6-place Beechcraft Twin-Bonanza. Business executives around the world use them.

—(Beech Aircraft Photo.)



Used by presidents and kings, as well as business men, light twins such as this 6-7-place, 240-mph. Aero Commander have a long record of safe, dependable and economical air transportation to recommend them for scheduled public service.

—(Aero Commander Photo.)

The result of using a plane with capacity far in excess of demand is amply indicated by the fact that 78 points out of 461 served by the local service airlines in May, 1961, were provided only a single daily round trip—nearly 17% of the total points served.

A third level of airlines, geared directly and solely to meeting the needs of these "lost" and marginal cities (and others that may never have received consideration for service) might well be placed in operation today, relieving the local service airlines of much of their high-subsidy-demanding services.

With Congress concerned about the amount of subsidies for local service and helicopter airlines, this seems like a poor time to consider still another airline system that will also require subsidy. However, if properly administered, third-level airline service can be brought to 125 to 250 cities, and it can be done at little or no increase in over-all airline subsidy.

It should be possible to bring airline service to as many as 250 cities not otherwise served, and at a subsidy cost not to exceed $12 million annually. At the same time about the same amount, or even more, might be saved in subsidy paid to the locals by releasing their services to some 50 to 75 of these cities.

Light Twins But No DC-3's

Between the idea and the eventual third-level system, however, are some major obstacles that can only be overcome by dedicated effort and considerable expense. If the present selection of light twin aircraft had been available in the 1945-49 period, when the present local service airlines were being organized, the pattern of airline service today might be vastly different from what it is. Many of the original applicants for local service airline routes proposed to use single-engine aircraft, and two actually started operations with them. Because no adequate intermediate aircraft between single-engine and DC-3 was available, all of the locals eventually went to the DC-3's. Once having made this step, there was no turning back. The die was cast; it seems to be impossible for an airline to move in the direction of smaller equipment.

Intensive investigation by the Author, supported by actual survey flights, indicates that light twins in scheduled airline service can be operated for a direct cost of under 30c per airplane mile. This figure includes pilot pay, pilot travel expense, employee insurance and taxes, fuel and oil, direct maintenance, hull insurance, and depreciation. This is half the goal necessary to make a third-level operation possible.

The other half lies in the paring of indirect expenses to half the level of that experienced by the local service airlines. In a specialized operation, this is possible. Just as the locals were able to make innovations that gave them a more economical operation than the trunks had experienced, so the third-level operators can and must tailor their methods to their own even more specialized function of public service.

If these proposed sub-local airlines can keep their total expense below 60c per mile, on routes that will permit them to average 3½ passengers per mile at an average revenue of 10c per passenger mile, then a maximum subsidy of 25 cents a mile will assure a break-even operation, and any increase in commercial revenue can become a profit. With a careful selection of routes, and with a keen eye on costs, third-level airlines can provide needed services — services which the government has been trying to provide, and is reluctantly abandoning because of much higher subsidy costs — and will afford a sharp stimulus to the aviation industry.

If the manufacturers of light twins will aid their dealers and distributors in establishing third-level airlines, they stand to gain not only an additional market for their products, but a golden opportunity to demonstrate their products to a steady flow of passengers, who might not otherwise have the opportunity to travel in an executive aircraft, and some of whom are bound to be likely prospects for light twin ownership.

Dealers Logical Operators

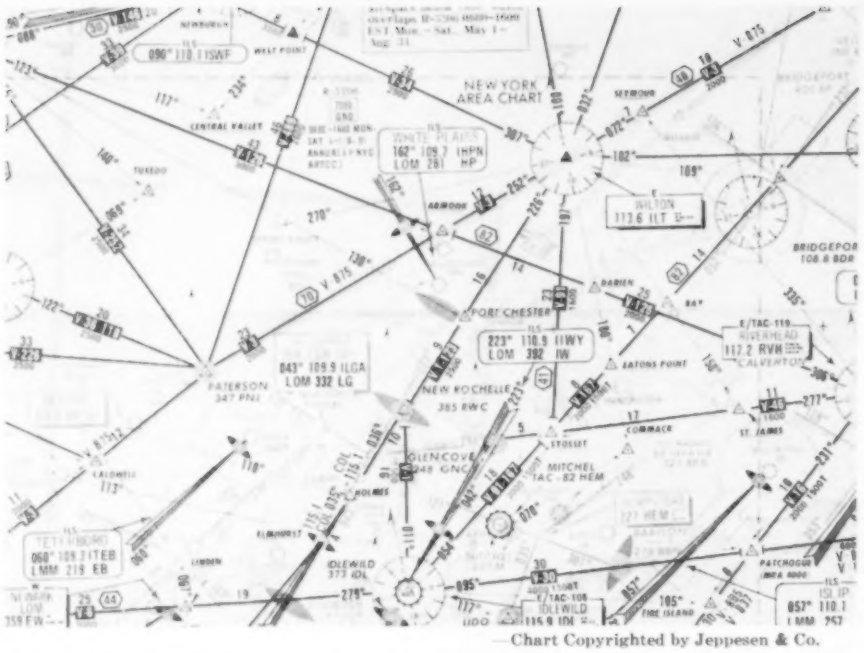
It is most logical that those operators who deal in the sales and service of the light twins should be the most likely operators of third-level airlines. They already have operating bases geared to service their products, and can thus better distribute overhead costs over both their sales and service organization and over the airline operation. They already employ skilled pilots familiar with their products. They also have at least a rudimentary knowledge of the territory that an airline in their area would be expected to serve.

A third-level airline should not be considered as a get-rich-quick scheme. The nature of all airline operations has proven generally incapable of substantial profits, and these small airlines can not anticipate being exceptions.

Nothing is apt to kill off the third-

(Continued on page 44)

By **WILLIAM G. GRAHAM**
Director, Flight Operations,
Mohawk Airlines, Inc.



—Chart Copyrighted by Jeppesen & Co.

Author's trial run (see article) begins over West Point (top, left of center) on this Jeppesen en route chart, which shows Idlewild destination at bottom center. Routing is to IDL Runway 4 Outer Marker via Wilton, Syosset, Hempstead and Lido. Larger-scale chart (right) will locate these points.

—(Chart Segment Reproduced Courtesy Jeppesen & Co.)

STUDY, TRAIN AND PRACTICE

High-Density Areas Demand Top Proficiency

FLYING in and out of high-density areas might be compared with the old expression about fools who walk in where angels fear to tread. To prove this point for your own satisfaction, just visit a busy Air Traffic Control Center sometime and you'll find out. The sad thing is, it need not be true.

For example, entering Idlewild control zone at New York should be no more difficult than completing an ILS approach at any other properly-equipped airport. Why, then, make the high-density areas such a problem?

The trouble is, far too many pilots lack the equipment, and above all, the training. From this stems all our headaches in high-density areas.

Let's take the equipment list. One VOR receiver and/or one VHF transceiver are not enough for IFR at any time. The absolute minimum consists of one VHF transceiver with a standby, two VOR's, a glideslope receiver, a marker beacon receiver and at least one but preferably two ADF's.

"How do I start flying into high-density areas?" is a question often asked. Well, if you've never been in one, the best approach is to go with someone who is well qualified in the area after, of course, you've practiced in the Link until you're qualified on the ground. You know you are qualified to fly your airplane but can you fly the Syosset holding pattern into Idlewild when there has been a missed approach or the landing aircraft is temporarily blocking the runway and approach control tells you, "Hold at the outer marker in a one-minute right-hand pattern"?

Practice, constant practice, is the answer to that and all the other problems. There is no problem if you can comply promptly; no problem if you don't have to borrow your VHF communications receiver to cross-check an intersection and then you can get back on approach control or center frequency to which assigned.

So let's assume you are properly equipped. Now you must plan and train for your first entry into the high-density area. You train on the Link or simulator, memorize your charts, familiarize yourself with the fixes, prime and secondary, the frequencies for communications as well as for navigation, know the preferential routings for entry and departure, study the minimums and assign yourself your minimums, perfect the normal missed-approach procedure for each facility —then you're ready, after much practice, to select a qualified partner with whom to enter a high-density area. We realize many do it solo, but what qualifies you to be more expert than the airlines with two pilots who fly IFR into the terminal regularly?

Well, you say, I have an instrument rating, my aircraft is well equipped and I have an automatic pilot. Very good. And you even have radar to assist you in most high-density areas. A lot of these items are similar to crutches and when the crutch is removed, what happens? It takes more than one man to monitor communications, navigate, estimate fixes, change radio frequencies, read the charts and change power settings and altitudes.

Just how much radar coverage do we have? Suffice it to say there are large gaps in radar coverage throughout the country—as we all were told after the recent United-TWA collision in the New York area. Even with good radar coverage, if local procedures are such that no one is supposed to watch you on radar as you pass from center to approach control, you're in a radar gap — and it's a big one. Even under radar observation we do not have the protection a lot of pilots think we have.

Vectoring is an additional service — only performed when the service does not interfere with the controller's first responsibility of separating his controlled aircraft. It's an extra, like advisories of unidentified traffic. Pilots now have to request vectors. All IFR traffic is considered to be on instruments. When a controller says you have traffic at 11 o'clock five miles, don't reply that you're on instruments. Rather, request a vector. Play it safe. If it's on the screen, it's your traffic.

Another common fallacy is illustrated by the pilot who says, "Well, today New York is 800 to 1,200 feet with two or three miles visibility — I'll go today."

These are the days for the neophyte to stay out. New York becomes sat-

urated more times when the weather is marginal than when it is down to minimums. At present, the jets are diverted at present minimums; entry is rather rapid at 200 feet and one-half mile as there are few aircraft. This doesn't mean that you should pick a minimum day to fly into New York. But remember, everybody is there on the marginal days, above minimums, when the visibility is above minimums and the ceilings between 600 and 1,200 feet.

Let's make a trial run into Idlewild Airport at New York, approaching from the Northwest:

1. Fly the centerline.
2. Maps and charts handy? En route charts, area charts as well as approach plates? For our approach we'll use Jeppesen.
3. Listen to traffic conversations as we approach. Are they using front or back course, are there any delays or holdings or special conditions?
4. We are entering the New York City area from the northwest via Victor Airway V-34, and give our position report over West Point, New York. Our No. 1 VOR is tuned to ILT and we are flying inbound on the 307° radial. Our No. 2 VOR is tuned to POU and set on the 233° radial. When centered, we give our report to the N. Y. Center.
5. N. Y. Center clears us to runway 4 OM via present position V34 ILT, direct Syosset, direct Hempstead, direct Lido, direct IDL OM. We repeat this clearance and continue to ILT. Weather is 400 ft., ¾ mile and there is considerable traffic in the area, varying from jets to smaller private aircraft. The spacing on approaches is a 3-mile separation and everything seems to be working normally.
6. Over ILT we report and give our Syosset estimate. We are at an altitude of 9,000 ft. New York Center acknowledges and requests that we contact IDL Approach Control. We comply and are instructed to proceed to Syosset to hold N.E. one minute right hand pattern on the 054° radial of the IDL VOR.
7. Shortly thereafter we are given descent clearance to 6,000 ft., to make our descent in the pattern. Our No. 1 VOR is on ILT and we are flying outbound on the 197° radial. The No. 2 VOR is on IDL with the 054° radial set. Upon reaching this fix we switch No. 1 VOR to IDL and set the 054° radial while slowing the airplane to pattern holding speed, reducing RPM to conserve fuel, then turn to left to enter pattern. The No. 2 VOR is then tuned to ILT with the 197° radial set.
8. This is all fine and no problem, but let's keep ahead of the airplane. The No. 1 ADF which is not being utilized at the moment, should be tuned and identified on the HEM range. We are entering a high-density area, a multi-million dollar airport and yet, some of the facilities which service the entry into this airport are of the low frequency era.
9. Approach control issues further clearance: "Now cleared to HEM, descend to 4,000." This is rapidly followed by: "Cleared to Lido and to depart Lido on a heading of 240° descent to 1,500." Our No. 2 ADF was already tuned to Lido. If not, immediately after passing HEM, this should be performed. Our No. 1 VOR, still tuned to IDL, should be set on 117° radial for cross-checking Lido. We report HEM and all is smooth and normal, no problem. We check Lido and report turning to a heading of 240°.
10. At this point, let's again keep ahead of our airplane. The No. 1 VOR and glideslope are tuned to IDL Runway 4R ILS No. 2 VOR to IDL VOR, for cross-checking positions and to preclude unnecessary radio tuning at a critical part of the approach. The No. 1 ADF is on IDL LOM, and the No. 2 ADF is on IDL MM.
11. We receive further vectors from the 240° heading after passing Lido and will be instructed to contact IDL Tower approaching the outer

(Continued on page 44)

Jeppesen area chart can be used by reader to trace Author's routing from Wilton (top right) along 197-deg. radial to Syosset, thence to Hempstead ADF and Lido and finally to Idlewild Runway 4 Outer Marker (bottom left).

—(Chart Segments Reproduced Courtesy Jeppesen & Co.)

—Chart Copyrighted by Jeppesen & Co.

Service City USA" ramp combines operations of five firms for complete one-stop servicing. At left is terminal-lounge and Flight Deck restaurant.
—(Tom W. Collins Photo.)

Service City U. S. A.

Five firms join to streamline one-stop business aircraft servicing

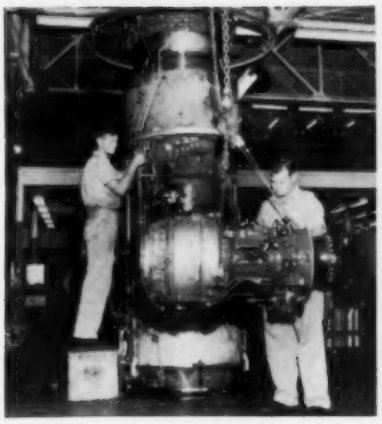
A GROUP of successful aviation merchants have banded together into a unique "partnership" on Dallas' Love Field to provide every possible one-stop service requirement of the business airplane owner. The organizations include Southwest Airmotive, Executive Aircraft Service, Associated Radio, Aero Instrument Service-Sales and Universal Weather Service.

In their first meeting, held last month, heads of the five sponsoring organizations unanimously approved cooperative sales activities, cooperative advertising and promotion and cooperative counseling with customers in solving all aspects of aircraft service, modification and maintenance.

Several years ago, Southwest Airmotive retired from the aviation electronics business and brought Associated Radio into leased properties. Later on, Aero Instruments moved in and finally, last month, Executive Aircraft leased Southwest's airframe overhaul facilities. Each concern will maintain its separate corporate identity, hawk its own wares and services in addition to the community effort and run its own show. Central accounting and billing will be available as needed. The members of the center all agree that the highest quality of work can be put out on schedule at reasonable prices and better personal relations with customers can be maintained by this system.

It's worthy of note that every company involved in "Service City" was a most successful operation before joining the combine. All of them are veterans in their particular fields. All of them, with the single exception of the weather service, had been, or were at the time of the agreement, engaged in certain auxiliary services by necessity instead of choice. For example, Executive Aircraft had an electronics shop. At "Service City" all electronics work will be done by Associated Radio; Associated Radio was formerly concerned with instruments but all this work will now be performed by Aero Instruments, who in turn have gone out of the customized panel business in favor of Associated Radio. Southwest Airmotive, in recent years specializing in engine overhaul, both jet and recipro-

Aircraft modifications and conversions are performed by Executive Aircraft Service, whose Lew Morrison, W. J. Connell and Shop Superintendent Ken Schumacher are pictured at left. At center, Universal Weather Service's Tom Evans and his wife, Caroline, brief Pilot George May. Aero Instrument Service-Sales' shop is at right.
—(Tom W. Collins Photos.)



Crossroads-of-the-air signpost (left) announces new service at ramp. Service City council meeting (center) is attended by executives of five firms. Around the table from center foreground are Tom Evans, president, Universal Weather Service; Ken Schumacher, vice president, and L. V. Emery, president, of Executive Aircraft service; Southwest Airmotive's J. E. Lockart, Jr., Winston Castleberry and George W. Jalonick III; Associated Radio's Lee Lanford, secretary-treasurer, and Ross Chapin, vice president, and Aero Instrument's Vic Ressler, vice president, and R. J. Stuart, president. At right, an airline Pratt & Whitney JT4 and a Lycoming T53-L-1A are largest and smallest turbines overhauled in Southwest Airmotive jet shop.

—(Tom W. Collins Photos.)

cating, line service, accessory and propeller overhaul and airplane distribution, was weary of airframe work. Now Executive Aircraft will take on this function at the Southwest Airmotive location.

With this kind of specialization, it's obvious that a more stabilized labor force will be maintained under closer control for greater efficiency. "We're convinced," said Jim Lockart of Southwest Airmotive's executive staff, "that these independent companies under professional ownership-management will work harder, work longer and sell more than if they were sub-divisions of a cumbersome Southwest Airmotive operation. We now can offer the airplane owner every possible service under one roof, a true one-stop service, with greater efficiency, more personalized service, but what's more important, lower costs."

"Service City" includes all the other attributes of a "nothing-to-be-desired" operation such as a day and night restaurant, car rental, aircraft charter and leasing, storage and refueling. Southwest Airmotive maintains the most elaborate business aircraft fueling system in the country. In addition, its distribution division, headed by George Jalonick, is one of the nation's largest parts and accessory supply houses.

Southwest Airmotive's business flying terminal will serve as a veritable chamber of commerce for "Service City" with a customer counter in the lobby to assist the visitor in anything from getting hotel rooms to baby-sitting. A central PBX telephone system connects the entire complex by special dialing. "Skylights," the company publication, will become the center's newspaper. A co-op advertising program is also in the works.

Southwest Airmotive president Winston Castleberry summed up his organization's reasons for and the objectives of the combined efforts of the five separate enterprises when he said: "We feel that the growing complexities of modern business aircraft service make it impossible for any single operator to so split his own time and talents and his corporate investment that he can successfully perform as a Jack-of-All-Trades. It appears to us that a carefully selected complex of specialists is the only logical answer to the type maintenance wanted, needed, and deserved by today's corporate aircraft owner."

Similarly, L. V. Emery, president of Executive Aircraft, Inc., whose main establishment is and will remain on Red Bird Airport, expressed his company's enthusiasm for the combine when he stated, "We're happy to be on this team because in this day of specialization you can no longer be all things to all people. The tremendous capital requirements to do business successfully make this proposition attractive because we have the advantages of bigness yet can remain relatively small and personalized companies.

(Continued on page 42)

Busy Service City ramp looks like "Lodestar-Douglas Heaven" during rush hour for corporate transport traffic.

—(Tom W. Collins Photo.)

Buck Rogers come to life is Harold Graham, shown supported in mid-air by a Bell Aerosystems rocket belt developed for the Army.

Hovering portrait of world's first man-rocket operator shows Graham operating strap-on rocket device. Peroxide produces low-temperature steam for thrust from small nozzles.

Strap-on Man-Rocket

THE old Buck Rogers idea of a rocket belt to propel a man over barriers and up the face of cliffs has come to life as a Bell Aerosystems Company development for the U. S. Army Transportation Research Command. It is called the Small Rocket Lift Device (SRLD) and Bell has made over 30 flights with the man-rocket at Buffalo, New York.

Bell Test Engineer Harold M. Graham has flown the strap-on rocket belt over the ground at speeds of 20 mph. and distances up to 360 ft. at 3 to 4 feet off the ground and to the top of 30-ft. hillocks.

The Bell device consists of a twin-jet hydrogen peroxide propulsion system mounted on a fiberglass corset moulded to fit the back and hips of the operator. Graham slips his arms through padded lift rings attached to the corset. Metal control tubes extend forward on each side. A control stick on one tube permits him to change flight direction. A motorcycle hand throttle on the other tube allows him to regulate rocket thrust levels to control rate of climb and descent. Pitch and roll are easily controlled by body movements.

The little rocket system is fully throttleable. Hydrogen peroxide is forced under pressure into a gas generator, where it contacts a catalyst and decomposes into steam. The steam escapes through two rocket nozzles, providing thrust. Main thrust is directed toward the ground, while jet deflectors provide thrust for yaw control.

General Aviation Radio Fundamentals

By KEITH BOSE

Technical Staff, International Division, Collins Radio Company

ONE of the most dramatic developments of pure science came in 1865 when a British physicist, James Clerk Maxwell, devised a set of mathematical equations which predicted the possibility of radio waves. A few years later another scientist, Hertz, actually generated radio waves in the laboratory. This was the real beginning of aviation radio communication and navigation.

Radio and electronic equipment of today operate on certain simple fundamental principles discovered long ago. Pilots and chief pilots called upon to evaluate and purchase equipment must grasp the simple fundamentals or face the alternative of becoming blinded by technical details of incredible complexity.

A radio wave originates when the transmitter causes an electrical current to oscillate in an appropriate metal structure known simply as the antenna. The number of oscillations per second determines the *frequency* of the radio wave as it travels in space. Here is a convenient table of frequencies:

1,000 cycles = 1 kilocycle (kc.)
1,000 kilocycles = 1 megacycle (mc.)

Low Frequency (LF) ....30-300 kc.
Medium Frequency (MF) ....300-3,000 kc.
High Frequency (HF) ....3-30 mc.
Very High Frequency (VHF) ....30-300 mc.
Ultra High Frequency (UHF) ....300-3,000 mc.

The frequency of a wave determines its behavior. Low frequencies and medium frequencies up to about 1,700 kilocycles travel along the ground and "bend" with the earth's curvature. These waves along the earth are called "ground waves." Strong ground waves with a minimum of spurious reflections allow frequencies below 1,700 kc. to work best for an ADF (automatic direction finder). Some spurious reflections do occur at night and particularly sunrise or sunset result in "night effect" causing erroneous readings.

Practically speaking, the only low frequency device found aboard the larger airplane today is the ADF system. The design of an ADF must be adapted to the class of service as well as price range. Poor ADF design results in poor performance under crucial marginal conditions. The great disadvantage of lower frequencies is that they are highly susceptible to atmospheric noise. In bad weather, when atmospheric noise is greatest, ADF is needed the most.

Low frequencies require larger "ground planes," and in ADF the entire airplane structure as well as the loop and sense antenna becomes a part of the antenna system. In some airplanes, peculiarities in the airplane structure are a source of undesirable noise.

A modern high-performance ADF system providing maximum sensitivity is shown in Fig. 1. Such a system meets airline specification and is appropriate in airplanes of the Aero Commander class and above. The tuning control is provided with a counter dial to enable exact identification of stations by frequency.

"High Frequencies" are those from the medium range up to 30 megacycles. These frequencies are used today for long distance communication. In the HF range, radio waves reflect readily from the "ionosphere" or ionized layer which exists from 100-

614L-2 Control

137A-2 Antenna

FIGURE 1—This Collins DF-202 ADF system includes 51Y-3 four-band (90-1,800 kc) receiver, small remote tuning control with counter for exact frequency selection, sealed flush antenna with Ferrite correctors for quadrantal error correction and choice of indicators, one shown being radio magnetic indicator providing heading, VOR and ADF bearing. Total weight, less than 35 lbs.

51Y-3 Receiver

332C-1 RMI Indicator

250 miles above the earth. As reflected energy returns to the ground, it is again reflected from the ground, and a wave may be "bounced" thousands of miles — thus forming a means of global communications.

Unfortunately, the earth's ionosphere is in constant motion and varies with the time of day because of the sun's effect. Different frequencies have different angles at which they reflect, hence, in order to maintain constant communication with a certain station, frequencies must be changed to suit conditions.

A few years ago, airlines on long-distance hops carried a radio operator who had the duty of operating HF equipment. Today, HF equipment is tuned automatically by the pilots. Servo loops automatically "load" the transmitting antenna for maximum efficiency.

The need for HF in general aviation is not great except in airplanes operating over water or areas without VHF facilities. Usually a trailing wire antenna is used and the length adjusted for optimum "loading" as frequencies are changed.

"Very High Frequencies" do not reflect easily from the ionosphere. Also, there is no "ground wave" as in the case of Low or Medium Frequecies. Thus, VHF waves must reach another station with a "sky wave" along a straight path, and it is said that VHF affords "line of sight" communication only. Actually, waves travel slightly beyond the visual horizon due to refraction of the earth's atmosphere.

The line-of-sight characteristic of VHF has a great advantage for air-ground operations, for it allows effective communication within a radius of interest, yet other stations hundreds of miles away using the same frequency will not interfere.

When flying at an altitude 1,000 feet above a station, 39 miles is the maximum receiving distance regardless of the quality of equipment used. As the airplane flies higher it "sees" a point on the horizon at greater distance, hence, the greater the altitude the greater the distance. Maximum reception distances for various altitudes are shown on the back of aeronautical charts.

The FAA maintains a program for installing remotely controlled radio sites on higher elevations and to provide continuous communication on the airways. ATC centers are sometimes as much as 300 miles from the transmitting and receiving equipment.

The designated aviation VHF band runs from 108 to 135 mc. Localizers and low-powered omni stations are alternately assigned between 108 and 112 mc. En route omni stations operate from 112 to 118 mc. VHF communication frequencies run from 118 to 135 mc. and are now assigned in increments of .05 megacycles. Frequencies from 118.00 to 121.40 include towers, departure control, etc.; 121.5 is the universal emergency frequency isolated on either side by a "guard band;" 121.7, 121.8 and 121.9 are used for airport ground control.

FIGURE 3—Streamlined Collins antennas include 137X-1 (above), which combines two antennas, vertical one for communications and horizontal one for navigation. At right is Collins 31R-2, vertically polarized for VHF communications and used on jet transports.

FCC assignments are tabulated as follows:

118.00-121.40 (every 50 kc.) Airport control

121.50 Emergency

121.65-121.95 ATC

122.00-123.05 (every 50 kc. except 122.8 and 123.00) General aviation air-to-ground

122.80 Advisory (UNICOM) at airports without control towers

123.00 Advisory (alternate UNICOM) at airports having control towers

123.60-128.8 (every 50 kc.) ATC

132.05-134.95 (every 50 kc.) ATC

It is very important that transmitters operate within plus or minus .01 percent of the designated frequency. This requires the use of a quartz crystal which forms part of a stable oscillator. Each crystal is ground to operate at one definite frequency, and to change frequency requires that crystal as well as other circuitry be switched.

FIGURE 2—This lightweight (2¼-lb.) Collins 17L-8A transmitter covers 90 channels (118.0 to 126.9 in 100-kc increments), meets TSO requirements and is popular in Bonanza-class single-engine types and as standby in twins.

Inexpensive transmitters employ a crystal for each frequency and can operate on up to 27 channels. Obtaining continuous crystal controlled channels on all increments of .1 or .05 megacycles requires more ingenious and more expensive methods. Careful mechanical design of the switching units is imperative. Poor electrical design will result in *harmonics*, that is, transmissions may be heard on frequencies exactly two or three times higher than the one selected.

All VHF transmitters for general aviation are *amplitude modulated*, meaning that the voice signal is caused to vary the amplitude of the carrier wave. To do this a voice amplifier known as a modulator is used in conjunction with the final power amplifier of the transmitter. A transmitter can be roughly divided into four units, as follows: (a) Frequency synthesizer (crystal oscillators, frequency multipliers, etc.), (b) power amplifier, (c) modulator and (d) power supply.

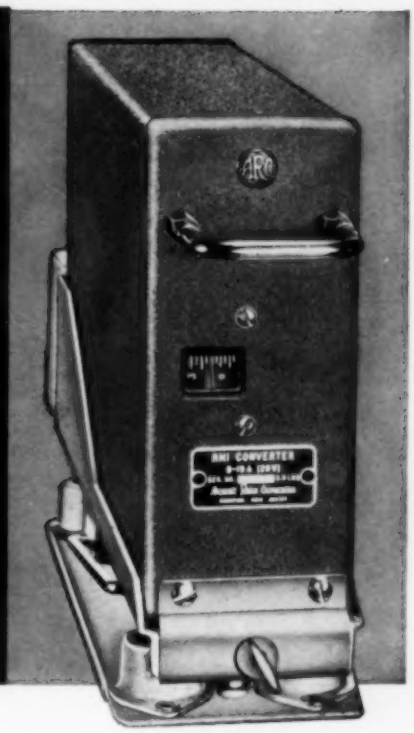
Designers try to package the four units mentioned above in a manner that will give maximum flexibility in custom installation. For example, a receiver requires an amplifier to drive a loudspeaker, but this amplifier can also double as a modulator for a transmitter.

An example of the latter is the Collins 17L-8A shown in Fig. 2. The frequency synthesizer and power amplifier of this unit are packaged together in the small panel-mounted unit shown, whereas the modulator and power supply may be provided in two ways. If the unit is used alone, the 427A-1 Modulator/Power Supply is used. On the other hand, the transmitter may be paired with the Collins 51X-3 receiver in which case the 427B-2 Power Supply/Modulator/IF strip will support both receiver and transmitter.

VHF receivers may be classified as "digital tuned" or "continuously tuned." Continuous tuning is similar to the method used in ordinary household receivers. That is, a dial is ro-

(Continued on page 42)

ARC'S B-19A RMI CONVERTER



NOW...FOR YOUR ARC OMNI
the completely new and unique
B-19A RMI CONVERTER
Provides an ADF presentation of the Omni. On VOR, or any ADF signal tuned, the indicator always points to the station.
INSTANTANEOUS MAGNETIC HEADING
CONTINUOUS INDICATION
SELF-CONTAINED POWER OPTIONS
COMPACT, LIGHT-WEIGHT
CERTIFIED TO TSO, CATEGORY A
Aircraft Radio Corporation

THE EXTREMELY VERSATILE B-19A GIVES YOU WIDE OPTIONS IN INSTALLATION AND USE!

The convenience of RMI presentation is provided by the B-19A, and with the many options available you use only what your system requires. Make your own module selections! ARC's new and unique B-19A RMI Converter gives you flexibility of choice and exclusive features for your individual flight requirements. You enjoy greater flying pleasure with a system custom-tailored to meet your specific needs. *But get the whole exciting story! Write for illustrated, colorful, free brochure today. Or contact your nearest ARC Dealer.*

1. Works with a slaved vacuum gyro system and existing Arinc-type compass systems!
2. Has its own **self-contained** 400 cycle transistorized power supply!
3. Is light in weight, small in size, easy to install!

ARC

Aircraft Radio Corporation

BOONTON, NEW JERSEY

RESEARCH, DESIGN, DEVELOPMENT AND PRODUCTION OF ELECTRONIC EQUIPMENT SINCE 1928

HERE'S THE SIGN OF THE FINEST SERVICE FOR YOUR PIPER AIRPLANE

Piper has established a world-wide network of Factory-Certified Service Centers to assure you of the finest service possible for your Piper airplane.
To earn the coveted designation, service organizations must meet rigid requirements, must be properly equipped and staffed by personnel who have attended the intensive service school conducted at the Piper plant.
Dozens of Piper Factory-Certified Service Centers have been established throughout the nation and around the world, and more are being designated to assure convenient and competent Piper service wherever you may wish to fly.

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Austin, Texas

CATLIN AVIATION CO.
Will Rogers Field
P. O. Box 2398
MUtual 5-6644
Oklahoma City, Oklahoma

CUMMINGS & GROVES AVIATION, INC.
Houston International Airport, Hangar No. 8
MIssion 4-5593 *and OLive* 4-4351
Houston, Texas

DELAWARE AVIATION CORPORATION
North Philadelphia Airport
HObart 4-1600, *TWX PH* 520
Philadelphia 36, Pennsylvania

EXECUTIVE AIRMOTIVE, INCORPORATED
Stewart Air Park
P. O. Box 70
GArfield 8-3581, *GArfield* 2-7277
Parkersburg, West Virginia

J & J AIRCRAFT, INC.
Sarasota-Bradenton Airport
821 *General Arnold Road*
ELgin 5-6868
Sarasota, Florida

KEN-MAR AIRPARK, INC.
Ken-Mar Airpark
Box 2667, *University Station*
MUrray 3-6589
Wichita, Kansas

RED AIRCRAFT SERVICE, INC.
Broward County International Airport, Building 78
JAckson 3-9624
Fort Lauderdale, Florida

ROSS AVIATION, INC.
Riverside Airport
CY 9-5055
Tulsa, Oklahoma

UP UP UP UP UP UP UP

SALES

Today, more than ever before, the civilian helicopter is performing an ever greater variety of tasks in business, industry and agriculture.

Leading in these areas is the Brantly B-2 helicopter with nearly 150 deliveries in just little more than two years since certification. *There must be reasons!*

First, the B-2 is priced at less than half of other helicopters on the market. This permits commercial operators to get the service of the helicopter at a practical, down-to-earth investment. Also, the B-2 opens up a new vista for private and pleasure flying.

Second, the Brantly B-2 out-performs, out-distances others while providing the lowest operating and maintenance costs in the industry. The B-2 has many 2500 hour vital component parts. This plus simplicity, safety, and dependability add up to America's leading civilian helicopter.

Third, and equally important, is the B-2's fly-ability. Helicopter pilots love the B-2 for its responsiveness, the ease of coordination. Fixed-wing pilots make the transition to the B-2 in mere hours. The student learns faster because the B-2 is a perfect trainer.

Is it any wonder, then, why Brantly B-2 sales are going up? Before you invest in a helicopter, before you even consider it, you must see and fly the B-2. **There are a few prime distributor and dealerships available in prime areas for alert, aggressive organizations. Write for information and descriptive brochure.**

Brantly **$19,950 F.A.F.**

BRANTLY HELICOPTER CORPORATION, DEPT. F, DREAM'S END 3, ELKHART, INDIANA

Delivery of the 100th Brantly B-2 helicopter came only 24 months after FAA certification and is shown at left. Left to right are J. D. Morton, president of Aero Enterprises, Dunlap, Indiana, accepting No. 100 from Brantly Sales Manager Al Alson and N. O. Brantly. Final assembly line (below) at Brantly factory shows six B-2's. Factory at Frederick, Okla., produces 15 B-2's monthly with staff of 150 workers.

NOW widely used in industry, agriculture and business flying, modern helicopters became a commercial success only after long military development and production. But the latest success among them has vaulted into prominence without benefit of military spawning or development. It is the zippy little 2-place, 150-hp. Brantly B-2. Its designer devoted 15 years of painstaking backyard development before offering it on the market — and then went commercial without seeking military sponsorship or funds.

The plodding perfectionist who kept his creation to himself until he was sure of acceptance is Newby O. Brantly, a Philadelphia mechanical engineer. He obtained FAA airworthiness approval of his design in April, 1959, and his B-2 was such a hit he delivered B-2 No. 100 only 24 months after the FAA licensed the design.

Brantly's remarkable little copter boasts two major points of distinction: (1) It is the lowest-priced helicopter on the market at $19,950 and (2) its rotor blades have extra flapping hinges and lag hinges located about half way out from the rotor head, in addition to the customary hinges and pitch-change bearings at the rotor head. This distinctive feature permits freedom of blade motion to provide greater response, keep the blades in phase at higher speeds and eliminate feedback of undesirable forces into the drive system, controls or fuselage.

Even without concentrated selling efforts, the B-2 won early sales. "Other manufacturers had overlooked the market's need for a small 2-place utility copter capable of going reasonable distances and which could be operated from small areas," Brantly explains. By October, 1960, Brantly had become convinced there was a greater untapped market than anticipated and launched an all-out sales drive by doubling production from one to two B-2's a week and by taking on M. L. (Al) Alson as vice president of sales. Alson soon doubled production to 4 a week. "We'll be turning them out at a rate of one a day by the end of this year and we expect to be producing them at a rate of 500

SALES SENSATION

units annually by 1963," says Alson.

Brantly Helicopter Corporation has its headquarters in Philadelphia, its general sales offices in Elkhart, Indiana, and manufactures its helicopters in a factory at Frederick, Oklahoma. In addition to 27 distributors covering Brantly sales throughout the United States, the firm has 9 foreign distributors.

The B-2's success and that of its manufacturer is a phenomenon of the aircraft industry. N. O. Brantly learned to fly in 1925 in an OX5 Curtiss Jenny, obtained one of the earliest instrument pilot ratings and in 1931 built an ingenious two-cylinder, opposed-piston aircraft engine weighing only 180 lbs. but producing 140 hp. But success in aviation evaded his efforts during the Depression and he went into textile machinery designing. He acquired success and fortune in Philadelphia with the Penn Elastic Co. In 1942, when Brantly saw Igor Sikorsky's pioneering VS-300 helicopter, the rotary-wing aircraft idea revived his aviation enthusiasm and within a year he had completed the engineering for a 2-place helicopter of his own, the B-1. Its construction was completed in 1946, when it made its first flight at Brantly's farm.

Brantly's first little helicopter didn't satisfy his ideas of what the civilian market needed in the way of price, performance and safety. "So we changed a thousand and one things and built a B-2 version," he recalls. "No thought of selling a helicopter crossed our minds until we knew we were 'right' — we had to be sure." By 1953 he began to visualize civilian sales and organized the Brantly Helicopter Corporation as president with Penn Elastic Company partners as officers. Brantly didn't unveil the B-2 until 1956 and held it off the market even then. In April, 1959, after 15 years of development and painstakingly perfecting his creation, Brantly obtained FAA airworthiness certification for the B-2 and began accepting orders for it.

Two years later, Brantly today says: "I think the possibilities of the helicopter market are so large and so fantastic that I wouldn't attempt to guess the market's saturation point. It will be many more years before the helicopter takes its place with the automobile but the more experience we and other manufacturers gain, the more we can boost production and the sooner we will be able to see and accelerate consumer acceptance.

"We see signs, even today, that the helicopter is coming into its own. The safety engineering we have accomplished has caused insurance companies to begin reducing rates to the extent they are nearly those of fixed-wing aircraft. The other day our insurance people told us that all companies have given the 'green light' to their salesmen to write all the insurance that can be written. This certainly is a testimonial to the progress that helicopters have achieved. Perhaps more importantly, the actuaries who plot probable accidents have given a clean bill of health to the helicopter — at least to the B-2."

Brantly is continually improving the B-2. Some months ago he began experimenting to eliminate the customary internal ribs of the rotor blades. He perfected a method of bonding aluminum skin and leading edge spar to polyurethane (much like styrofoam). In effect, this makes a solid rotor blade, eliminating all ribbing and associated riveting. The plastic foam is pliable to the extent that it will tolerate the whipping action of the blade yet strong enough to return the blade to its true shape. One obvious advantage of the new B-2 blade is the fact that, since B-2 No. 64, thousands of hours of on-the-job flying have been accomplished with no blade cracking or deformation. The FAA has rated the new Brantly blade for a 2,500-hr. life, according to Brantly.

There have been numerous other refinements. The S-200 magneto kit has been added to the Lycoming VO-360-A1A engine for easier starting and the starter ring gear ratio was changed to 3:38 to 1. The 50-amp generator was adopted.

The Brantly induction cooling system has more than met expectations. It utilizes the exhaust gases to create a pressure drop in the exhaust manifolds, drawing cooling air through the cylinder-head baffles. Cooling air enters the engine compartment through air scoops located near the top of the engine compartment on each side. In forward flight, the cooling air volume is further increased by ram effect. This system does not pull any power from the crankshaft. It has been estimated by Brantly that an engine-driven cooling fan as conventionally used on helicopters would rob the Brantly rotor system of 20 hp.

A conventional oil radiator has replaced the B-2's original external oil cooling coil of finned tubing wrapped around the tail section. The radiator is supplied with ram air from formed ducts on each side of the engine compartment and is further cooled by a fan driven from the tail rotor drive shaft by double pulley and dual V-belts.

Sales Manager Al Alson, who reported the above improvements, also reports that Brantly is conducting a continuous program of developing and approving accessories for the B-2.

"Probably the most significant accessory which has been FAA-certificated is our agriculture spray equipment," Alson said. "The 40-gal. tank is of molded fiberglass. It is formed to fit and clamp to the fuselage directly under the engine compartment. Mounted here, the tank does not affect the center of gravity, loaded or empty. Honeycomb baffles inside the tank hold the spray liquid in place to reduce the chance of a shifting load more than one inch in any attitude or load condition."

He said two 12-ft. outrigger booms of one-inch aluminum tubing are quickly rigged and will spray a 28-ft. swath through 24 anti-fouling plastic nozzles. The booms are supported with 1/16th-inch aircraft cable. Weight of the spray equipment is about 35 lbs.

Brantly B-2 Helicopter

FACTORY DATA

Price	**$19,950**
No. Seats	**2**
Horsepower	**150**
Gross Wt., lbs.	**1,600**
Empty Wt., lbs.	**980**
Useful Load, lbs.	**620**
Useful Pct. of Gr. Wt., %	**39**
Fuel Capacity, gals.	**31**
Range, miles	**300**
Speed, mph.	**100**
Rate of Climb, fpm.	**1,580**
Service Ceiling, ft.	**11,400**
Length, ft.-ins.	**21-9.1**
Height, ft.-ins.	**6-11.75**
Cabin Width, ins.	**47**
Rotor Diameter, ft.-ins.	**23-8.89**
Number of Blades	**3**
Disc Loading, lbs. sq. ft.	**3.58**
Power Loading, lbs. hp.	**8.9**
Skid Gear Tread, ft.-ins.	**5-8.25**

NOTE: Performance is for gross weight at sea level unless noted.

GENERAL AVIATION RADIO

(Continued from page 36)

tated until the station attains maximum volume and clarity. Unless a ground station is actually transmitting it is impossible to tune to it. Dial settings vary with age and temperature and cannot be depended upon for exact tuning. Thus, a pilot must fiddle with a dial during busy moments, sometimes losing part of a transmission. Nevertheless, continuously tuned receivers can receive all channels and they are much less expensive.

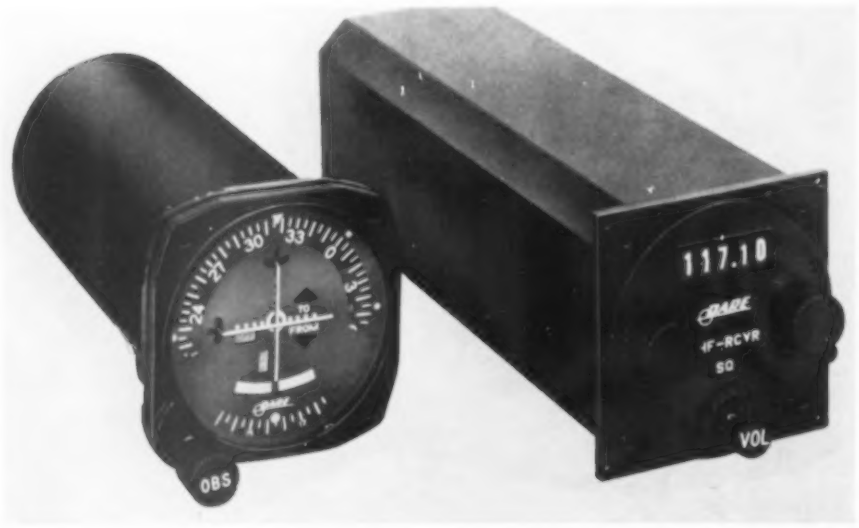
Digital tuned receivers employ crystals to synthesize a local frequency which can be "mixed" with the incoming signal to produce a very stable Intermediate Frequency which can be amplified to produce the detected signal at the loudspeaker. Crystals are arranged in much the same manner as in transmitters to produce exact channels at each 100 kc. or 50 kc. Thus, the pilot can quickly set to any pre-arranged frequency.

The performance of a receiver is measured by its ability to pick up weak signals (sensitivity) and separate a signal of one channel from another on an adjacent channel (selectivity). Both of these characteristics are related by the signal-to-noise ratio of the receiver. In general the lower the signal-to-noise ratio the better the performance.

Receivers must be able to amplify the tiny signal picked up on the antenna by a factor of over one million. Such a large amplification factor means that tiny currents generated even by molecular motion itself will be amplified to produce the familiar roaring or rushing sound in the receiver. When no signal is being received, the receiver is operating in its most sensitive condition and the constant rushing sound in the speaker and headphones is quite annoying to the pilot. Squelch circuitry is employed which cuts off the audio output when no signal is being received. Pilots must carefully set the squelch control to prevent missing calls from more distant stations. In general, optimum setting is usually that point where noise is just perceptible.

In VHF systems, navigation antennas must be carefully designed and installed to prevent "propeller modulation" which occurs when the spinning propellers reflect energy into the antenna which is modulated by propeller motion. Propeller modulation has an undesirable effect on omni and localizer performance. Antennas used only for communication must receive and radiate uniformly in all directions, but there is little other requirement except radiation efficiency and streamlining.

Sometimes both communication and navigation antennas can be combined in one physical structure as in the Collins 137X-1 shown in Fig. 3. Both the communication and the navigation portions have essentially omnidirectional patterns. The antenna system has a drag of 2.7 pounds at 250 mph. at sea level. At 600 mph. the antenna offers 15.3 pounds of drag. At mach .9 at sea level the antenna will withstand forces at attitudes of up to 5 degrees pitch and 5 degrees yaw. The metallic antenna structure is enclosed in a fiberglass plastic filled covering and is able to undergo extreme environmental conditions.



Miniaturized All-Transistor Nav-Comm System

A significant new miniaturized all-transistor nav-comm system is offered by the new 480-channel (108.00-131.95 mc), crystal-controlled DR-480 VHF Receiver and DNCI-1 Converter-Indicator. They are only 10⅝ ins. and 8⅝ ins. long, respectively, and weigh only 5 lbs. combined, drawing only 170 milliamperes at 27.5 volts DC. They fit 3⅛-in. panel cutouts, need no shockmounting and can operate on aircraft electrical system or battery power. DNCI-1 presentation includes complete VOR-ILS with to-from and flag alarms. It works with any standard omni receiver. Dare, Inc., Troy, Ohio, said two units are first in a new miniaturized line.

SERVICE CITY USA

(Continued from page 33)

The mutual advertising program is a natural and all of us will benefit equally from it. Among the possible advantages in the future will be a mutual sales force, a central accounting office and cooperative engineering."

Since Southwest Airmotive completed its modern facilities several years ago, transient business through the terminal has consistently increased to a point where now it is estimated a total of 50,000 to 75,000 airborne people arrive and depart annually and another 150,000 to 200,000 non-airborne people pass through the terminal, either meeting people, seeing them off, using the restaurant facilities or just visiting. These estimates of human traffic flow lead most business aviation observers to grant this 30-year-old institution the distinction of being America's busiest business airplane terminal, in a large part responsible for Dallas' Love Field traditionally remaining in the top ten of the nation's busiest airports. The establishment of Service City USA, through the unusual combination of service facilities by so many blue-ribbon institutions covering the entire spectrum of business aviation's needs, certainly should cinch this enviable position in U. S. aviation as well as provide a stimulus to the improvement of service facilities elsewhere—G.E.H.

"Service City Cindy" presides over information desk in lobby of terminal lounge. She's Cindy Castleberry.

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Many pilots are aware their life insurance policies exclude the aviation hazard. We offer you—if you fly commercially or for pleasure and business and have 200 or more solo hours

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Joe De Bona Co., Inc

GENERAL AGENTS

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GR 7-1286 BR 2-2177

HIGH-DENSITY AREAS

(Continued from page 31)

marker. This complied with, IDL Tower requests we check the OM and the field in sight.

12. At any time during this approach the pilot should have no difficulty, providing proper planning and study have gone before. Any hurried or necessary changes such as hold Lido, return to Brentwood, etc., should not confuse the issue because the flight has been pre-planned and the pilots are ahead of the airplane at all times.

Now we've negotiated an approach during instrument conditions into N. Y. International Airport through and in a high-density area. Remember, planning, study and practice were the prerequisites for this flight.

We are all responsible for insuring that the highest standards of safety as established in commercial aviation are maintained, so the degree of responsibility on the corporate and private pilot is great.

The FAA has a new Administrator and a relatively new organization, structure-wise. It is growing rapidly and it, too, is planning for the future.

Today, many of the facilities for handling all the traffic are inadequate. To give you an example of what does happen in high-density areas, here's what our airline experienced on a recent Friday when the weather was IFR throughout Mohawk's system. We operate into and out of many of the so-called high-density areas and on this day with the New York area marginal, but not down to minimums, we experienced many delays. The area was saturated with airplanes. A holiday was approaching and everyone was flying. Of 79 scheduled flights, we were able to terminate only 6 within 15 minutes of schedule due to ATC problems. One of our flights took 2 hours and 26 minutes to fly from HPN to IDL. Another had an average ground speed of 45 mph. from Saranac Lake to Idlewild. Out of the New York area, our flights experienced an average of 28 minutes delay, and these delays ranged from six minutes to over one hour. Flights were required to hold in run-up position at HPN for as long as one hour and 20 minutes in order to get a clearance to EWR.

You can see how confusing this would be if planning, study and practice were not followed by all the flight crews who operate into the area under such conditions. One confused or lost aircraft would have compounded this situation, creating further unnecessary delays to hundreds of aircraft and possibly compromised the safety of some.

To summarize, flying into and out of high-density areas requires that the pilots train, practice and study in order to constantly maintain individual proficiencies. The airlines have continuous initial and recurrent training programs going on. There are many private companies equipped with ideal facilities to provide adequate and valuable training for the corporate and private pilot.

Mohawk flight crews are given line checks into and out of high-density areas at least twice a year during IFR conditions, six-month proficiency checks are a must, six hours of recurrent Link training, 12 hours for first-year men and 30 hours of home study course are programmed to familiarize flight crews with changes and for purposes of review. New first officers must observe the routes and fly into and out of high-density areas on the jump seat for 25 hours before receiving their line assignment. And remember this: training and checking are considered necessary even for these pilots who daily enter high-density areas and average over 130 entries per month.

Let's study, train and practice to become proficient when flying into and out of the high-density areas. Set your standards gradually and do not push weather minimums. This is the golden age of opportunity. So let's go forward in the 60's. The corporate and private pilot must bear his share of responsibility in our goal of "safety is no accident."

Copter Ground Trainer With Transitional Lift

A new Whirlymite one-man helicopter ground trainer mounted on a highly mobile ground effect machine can be flown at forward speeds necessary to provide transitional lift. The self-trainer is attached to the air-cushion platform through a simple ball joint and scissors mechanism allowing it to rotate in azimuth, rise up and down vertically and tilt in any direction without getting more than inches off the ground. Del Mar Engineering Laboratories of Los Angeles perfected it.

THIRD-LEVEL AIRLINES

(Continued from page 29)

level opportunity quicker than its promotion by individuals who would think of themselves as airline tycoons. The very smallness of the operations, with the ability to pay attention to all of the details of the service, is the hope for success. High salaries and large executive staffs are not compatible with the nature of small-scale operations such as this. At the same time, this very smallness works a distinct handicap on the opportunity for third-level systems even getting started.

Presently established procedures for making applications for routes before the Civil Aeronautics Board are highly complex and require experienced assistance that can be very costly. A careful choice of route structure, an accurate presentation of costs and of forecast revenues, and an ability to improvise new methods of passenger service and ticketing are essentials for a favorable presentation before the CAB. Another essential is the ability to have these plans, ideas, and ideals stand up under a searching cross-examination by possibly antagonistic local service and trunk airlines.

Role For Aircraft Manufacturing

Here is a major service that the manufacturers of light twins can provide for their dealers and distributors

NEW from HUMBLE

A HIGH-PERFORMANCE ashless dispersant oil

Now — through Humble research — an ashless dispersant oil delivering the *extra* performance for which Humble aviation lubricants are famous!

New ENCO Aviation Oil E, with its exclusive combination of additives, keeps engines *cleaner* from nose section to pistons, from rocker box to oil screen. Reduces oil consumption, wear, maintenance. And because it is *ashless*, it cannot induce plug fouling.

The unusually high performance of this new oil enables two grades, E-80 and E-120, to meet all viscosity requirements of piston engines in all seasons.

New ENCO Aviation Oil E has been flight tested for over 15 million engine miles . . . tested by air lines and private pilots . . . cleared for use by every major U. S. aircraft engine manufacturer. Get it now from your Humble aviation dealer.

ENCO
AVIATION PRODUCTS

HUMBLE OIL & REFINING COMPANY
America's Leading ENergy COmpany

interested in operating third-level airlines. The cost of expert consultation and of legal counsel in preparing presentations before the CAB can be borne by the manufacturers and distributed over a dozen or more non-competitive applicants, none of whom can individually justify the total cost. Even the simplest of applications, if contested, can cost upwards of $10,000 for attorney's fees, travel expense, printing, postage, and research under present CAB certification procedures.

The CAB can be expected to look upon third-level proposals with skepticism, but without antagonism. The CAB calendar of dockets yet to be heard is backlogged, the Board's staff is shorthanded, and the pressure upon them is great; they cannot be expected to look with enthusiasm upon a proposal that might establish an entirely new class of airlines to add to their burdens. This means that the approach to a third-level must be carefully prepared, thoroughly documented with solid facts, and must be able to clearly show that the new services can be provided with little or no additional subsidy, preferably with a reduction in over-all subsidy requirements.

Congressional support can be anticipated for third-level service if Congress is convinced of its practicality. The majority of Congressmen will have one or more cities in their districts that may benefit from the services. This is grassroot support of a very strong kind. In the Senate, Mike Monroney from Oklahoma is known for his interest in the use of smaller aircraft, such as the light twins for maintaining service to marginal communities. Monroney is Chairman of the Aviation Subcommittee of the Senate Interstate and Foreign Commerce Committee.

Plug-type cargo door is on right side of Beech 18, opposite passenger door. It is 56 ins. long and 33 ins. high.

Big Cargo Door For Beech Twins

A new plug-type cargo door has been perfected and licensed by Atlantic Aviation, Wilmington, Delaware, for Twin Beech Models D18S, C-45G and C-45H. It measures 53 ins. long by 33 ins. high, providing about 15 sq. ft. of unobstructed entrance, and is located on the right side and aft of the wing trailing edge for easy loading of stretchers or large cargo items such as caskets. The door adds 78 lbs. to the aircraft empty weight and costs $6,750 installed at Wilmington. Atlantic Aviation will appoint other qualified shops to offer the modification. First air ambulance-hearse using the modification is operated out of Alexandria, Virginia, by Special Air Services, Inc. It features large-capacity oxygen supply for resuscitation or other needs and two 115-volt electrical systems for portable iron lungs.

With stretcher patient, air ambulance Beech carries three passengers in addition to crew of two. This is looking forward.

Sympathetic FAA Needed

The FAA presents a greater obstacle to eventual success than does the CAB. The FAA's Air Carrier Branch is geared to the problems of airline operations on a major scale. A new outlook must be developed by these people, scaled down to fit the economics and operating problems of small aircraft on limited routes. To attempt to apply even DC-3 operating practices and requirements to the light twins is to burden the third-level operators with economically impossible requirements. But the ground work has been laid in the history of those local service airlines that operated with single-engined equipment in the late '40's. Coupled with the experience in regulating the air taxi operators and the history of single-engine airlines, all that is needed for a practical solution is a sympathetic attitude upon the part of the FAA and the realization by the third-level proponents that the FAA takes seriously its job of assuring the safety of the fare paying passenger.

Third-level airlines must develop new practices to control costs. First requirement is for single-pilot operation during VFR conditions. Co-pilots would be utilized only during times when instrument conditions are anticipated and encountered. Certainly, by now, there is sufficient experience with single-pilot operation of light twins to prove feasibility and safety. Although the second pilot for instrument operations may not be physically required, it might remain as a concession to top safety practice and to passenger reassurance.

Accounting practices and required reports to the CAB should be simplified for third-level operators. Demands such as those placed upon scheduled airlines today would place a burden upon a third-level airline that could amount to two or three cents a mile in costs.

Costly teletype networks would probably be impossible for these small operators. As most of these smaller airlines would be expected to operate over a limited area, radio communication should be satisfactory to handle station-to-station messages. Distances of up to 60 miles are being handled adequately by a similar method in the

OVER

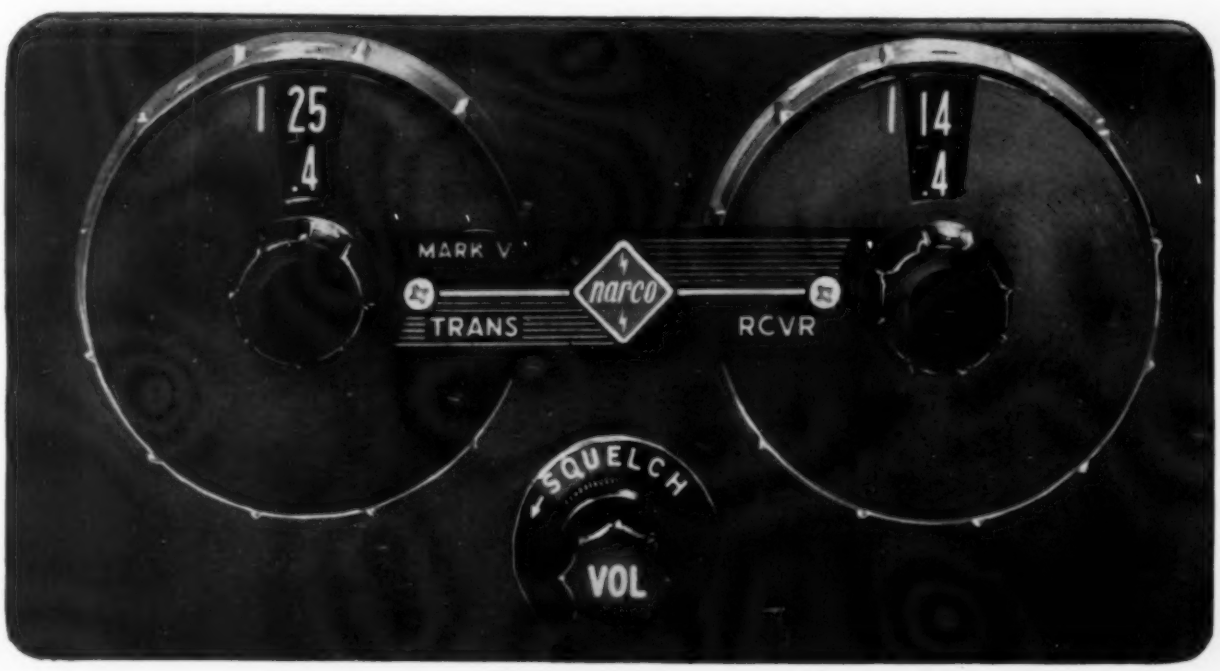
NOW over 7,000!

BECAUSE IT'S THE BEST ON THE MARKET!

NARCO MARK V's

more than all other "new generation" vhf comm/nav units combined!

So popular and so useful and so satisfactory is the Narco Mark V that it has outsold all of the other "new generation" lightweight, crystal-controlled VHF communications units combined. Offered as factory-installed equipment by every business aircraft manufacturer, the Narco Mark V has been so thoroughly improved and perfected that it is by far the best buy when you're looking for full channel capability for years to come.*



The Narco Mark V gives you 90 transmitting channels (118 – 126.9 mc), 190 crystal-controlled receiving channels (108 – 126.9 mc) covering *both* communications *and* navigation frequencies. Separate control heads permit completely flexible operation and use of the receiver section for VOR and ILS/LOC navigation with the Narco VOA-3A omni converter attached.

*Recently revised FAA "Frequency Deployment Plan" eliminates proposed requirement for TSO equipment for IFR and assures satisfactory IFR operation below 24,000' until at least 1966 for aircraft equipped with communications units having 100 kc spacing and frequencies below 127 mc.

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

operation of Los Angeles Airways' helicopters utilizing a remote transmitter for ground-to-air, air-to-air, and ground-to-ground messages (the ground-to-ground operation, incidentally, includes the use of mobile ground units in passenger automobiles).

Simplicity Key to Stations

Station operations should also be simplified. It should be possible to contract for representation at the small cities on a retainer plus percentage arrangement. This could be an attractive position for men retiring at an early age. It is also possible that a "station" could consist entirely of a Volkswagon Minibus-type vehicle equipped with two-way radio and possibly mobile telephone. Such a vehicle could carry passengers between airport and town and could deliver the passenger directly to and from the aircraft, eliminating the necessity for terminal buildings and ticket counter space.

Local station ticketing and reservations could be eliminated by use of a central office at the airport of the large city where connections would be made with trunk and local service airlines. Again copying the procedure in use by Los Angeles Airways, passengers from the smaller stations journeying to the large city could travel on a "memo ticket," exchanging this for a formal ticket upon arrival at the junction airport, and making payment at that time.

It might be possible to qualify third-level airline stations as "travel agents" and allow standard commissions on ticket sales as a substantial aid in offsetting subsidy requirements. Naturally, such an arrangement would have to be regulated and monitored to prevent abuses, but the potential gain for the larger airlines might well justify the effort involved.

Is $6 for a 60-mile journey, or $10 for a 100-mile trip excessive? Such fares would be required to bring about a yield of 10c per passenger mile. It does not seem too high when compared to car rentals such as passengers often resort to in order to reach off-airline points. Nor does it seem high in comparison to the convenience of linking airline services directly to the smaller city coupled with the availability of local contacts for reservations and information. At this viewing, it would seem that third-level airline traffic would be mostly connecting traffic, making them truly feeder airlines. In this respect, the $6 or $10 charge is blended into the fare for the entire journey and thus is not necessarily judged by itself.

One thing seems certain — if the third-level airlines actually can come into being, they will be small business in the fullest sense of the word. At the same time, they can potentially add enough additional traffic to the locals and the trunk lines to make a noticeable difference in the profit-and-loss picture of these big-business brothers.

In the meantime, the first steps toward a third-level airline system should be taken as early as possible. Time and tide wait for no airline or no aircraft manufacturer. A lot of intensive investigation needs to be done with the underlying conviction that we are far from reaching the total potential of scheduled air service to all our people.

(NEXT MONTH: Subsidy control, the organizational form of a third-level airline and a look at typical areas where third-level air service might operate.)

CAB Expedites First Third-Level Airlines Case

INTEREST in third-level airlines is mounting. The Civil Aeronautics Board has established an expedited proceeding to consider the application of Hi-Plains Airways of Hill City, Kansas, for an ambitious, multi-stop service in the area bounded by Denver, Wichita, Kansas City, Omaha, and Bismarck. Hi-Plains says it will use Aero Commander light twins.

Pre-hearing Conference in the Hi-Plains case was held on July 27, at which time Central Airlines filed two "conditional" applications for experimental service of a similar nature. Central's applications read, "In the spirit of cooperation . . . if public need requires an experiment in the operation of light twin-engine equipment to certain points of the nation, then Central . . . on a suitable basis . . . would experiment . . ." Central states that they "would expect the protection of public service payments subsidy . . ." Central's applications were for two services, one in Colorado and Kansas, and the other in Oklahoma.

Remmert-Werner's Mobile Repair Station

To perform service and maintenance away from its key corporate aircraft bases at St. Louis, Pompano Beach and Toledo, Remmert-Werner uses specially-built and equipped field service units as pictured here. They carry parts, accessories, tools, self-contained power generators, compressors, welding bottles, manuals, desks, files and everything to keep 'em flying.

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Will Rogers Field
Oklahoma City, Oklahoma

ALAMO AVIATION, INC.
Municipal Airport
San Antonio, Texas

ATLANTIC AVIATION CORP.
- Teterboro Airport
  Teterboro, New Jersey
- Logan International Airport
  East Boston, Massachusetts
- International Airport
  Philadelphia, Pennsylvania
- New Castle County Airport
  Wilmington, Delaware

BUSINESS AIRCRAFT, INC.
9011 Randolph Street
Houston International Airport
Houston, Texas — MI 4-5595

CURREY SANDERS AIRCRAFT CO., INC.
Downtown Municipal Airport
Shreveport, Louisiana

CUTTER-CARR FLYING SERVICE, INC.
West Mesa Airport
Albuquerque, New Mexico

ELLIOTT FLYING SERVICE
- Municipal Airport, Des Moines, Iowa
- Municipal Airport, Davenport, Iowa

GRAY AIRCRAFT SVC. CO., INC.
D. A. Cody, Service Manager
Love Field, Dallas, Texas

HARTZOG AVIATION
Greater Rockford Airport
Rockford, Illinois

THE NORMAN LARSON CO. PLANESERVCE, INC. (Service Division)
Van Nuys Airport, Van Nuys, Calif.
(Los Angeles Area)

PIEDMONT AVIATION, INC.
Smith Reynolds Airport
Winston-Salem, North Carolina

ROSCOE TURNER AERONAUTICAL CORP.
Municipal Airport
Indianapolis, Indiana

TEXAS AVIATION CORPORATION
G. K. Roberts, Pounds Field
Tyler, Texas

TOPEKA AIRCRAFT SALES & SERVICE
Municipal Airport
Topeka, Kansas

TRADEWIND AIRPORT CORP.
Tradewind Airport
Amarillo, Texas

TULSAIR DISTRIBUTORS, INC.
Hangar 8, Municipal Airport
Tulsa, Oklahoma

UNITED AIRPLANE SALES, INC.
New Municipal Airport
Wichita, Kansas

YOUNG AVIATION CORPORATION
Lambert Field
St. Louis, Missouri

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A good example of one of these extras is the CLOSE INSPECTION your aircraft and its accessories receive while it is being serviced on the ramp of a CERTIFIED BEECHCRAFT SERVICE STATION. Factory trained service personnel will spot — and call to your attention — any mechanism that is not functioning properly, thereby eliminating costly repairs later.

Certified BEECHCRAFT Service technicians, with their long specialized experience, know your Beechcraft from A to Z. But most important, they take a personal interest — and pride — in seeing to it that your Beechcraft serves you well.

Put Your BEECHCRAFT in BEECHCRAFT Hands

FIRST PIPER CHEROKEE DELIVERED from Piper Aircraft's new factory in Florida went to Southwest Air Rangers, El Paso. Left to right, Luther Blume, plant manager, congratulates Richard D. Callens, Piper dealer from Roswell, New Mexico, who picked up the Cherokee for Southwest Air Rangers, as Piper Project Engineer Karl Bergey looks on. The $9,795, 150-160-hp. 4-place Cherokee cruises over 130 mph. —(Piper Photo.)

HONORS FOR PIONEERS OF FLIGHT were bestowed recently by the District of Columbia OX5 Wing on Vice Admiral Patrick N. L. Ballinger (left), USN (Ret.) and Maj. Gen. Benjamin D. Foulois (right), USAF (Ret.), shown being congratulated by FAA Administrator Jeeb Halaby. Admiral Ballinger, 76, commanded NC-1 on Navy's first trans-Atlantic flight in 1919, and Gen. Foulois, 81, made his first flight in 1909 with Orville Wright. —(U. S. Air Force Photo.)

FIRST PRODUCTION BOEING-VERTOL MODEL 107 AIRLINER has undergone flight tests at Morton, Pa. The twin-turbine transport is same type scheduled for delivery to New York Airways. Vertol 107 carries 25 passengers, cruises 150 mph. In addition to N. Y. Airways, other purchasers include U. S. Marines, Royal Canadian Air Force, Royal Swedish Air Force and Navy and Kawasaki Aircraft Co., Japan.

AIR REPORT

(Continued from page 11)

it possible, for the first time, for the pilot to check its accuracy in flight. By pushbutton, the device interrupts one of the VOR's two signals and injects the remaining signal into both channels and the circuitry reacts as if it had received a signal from a zero-degree radial. The RMI automatically rotates to zero and, if the omni bearing selector is set to zero degrees, the flight path deviation indicator will center. Failure in either channel is detected and the amount of error is thus presented to the pilot. Clarence Rice, Bendix avionics manager, said the new feature provides three benefits — (1) improved flight safety, (2) increased pilot confidence and (3) reduced maintenance costs since fewer units will be unnecessarily removed from the aircraft for bench testing.

FRANCES S. BERA of Long Beach won the Powder Puff Derby July 8-14 for her fifth time and Aileen Saunders of El Cajon, California, last year's winner, was second. Miss Bera collected a $300 bonus prize and Mrs. Saunders a $200 bonus from AC Spark Plug — both used AC plugs.

LING-TEMCO-VOUGHT, INC., is the name of a single company in Dallas formed last month by combining Ling-Temco Electronics, Inc., and Chance Vought Corp. LTV officers include Robert (Bob) McCulloch, co-founder of Temco, board chairman and chief executive officer; James J. Ling, founder of Ling Electronics, executive committee chairman; Gifford K. Johnson, president; Clyde Skeen, executive vice president; Raymond C. Blalock, vice president-technical director; Lee D. Webster, vice president-secretary-treasurer, and James J. Kerley, vice president-controller. Director of public relations and advertising for the new LTV company is John W. Johnson, who held the same position with Chance Vought, with Jack Simon assistant director of public relations and advertising. Luke Smith, who was Ling-Temco's public relations director, is assistant to the board chairman.

LOCKHEED'S C-140 JETSTAR received FAA Class 1 provisional certificate last month after over 550 hrs. of flight time on production versions. FAA functional and reliability testing are now under way, with 5 airplanes in the flight program.

NEW OFFICERS OF THE NINETY-NINES, INC., international organization of women pilots, include Louise Smith, Highpoint, N. C., president; Barbara Kiernan, Boston, vice president; Barbara Evans, Manhasset, N. Y., secretary, and Alice Roberts, Phoenix, treasurer.

K. M. LANE, one of the two Wright Aeronautical service reps who got Charles A. Lindbergh off on his record New York-Paris flight in 1927,

retired recently from Curtiss-Wright after 31 years of service.

SIKORSKY AIRCRAFT AND SUD AVIATION OF FRANCE have signed a technical cooperation contract under which Sikorsky will provide design, test and construction assistance for Sud's new 3-jet Super Frelon 3210 helicopter, which will gross 24,250 lbs. and will be powered by 3 Turbomeca turbines of 1,300 hp. each. . . . **THE U. S. ARMY PRIMARY HELICOPTER SCHOOL** at Camp Wolters, Texas, which operates a fleet of 156 Hiller H-23D helicopters, recently accomplished its 1,000,000th student solo autorotation. Since training was initiated in 1957, the school has flown 365,000 helicopter hours, averaging 900 autorotations per day with only one accident in every 19,230 autorotations. . . . **FOUR NEW HILLER HELICOPTERS,** including a 4-place E4 for the president, were exported to Mexico recently, bringing the total of new Hillers in Mexico to 14. . . . **NEW BELL HELICOPTERS** have been delivered to Calicopters, Stockton, Calif., which received two turbosupercharged 47G-3B's to add to its fleet of 12 Bells, and Fitchburg Paper Co., Fitchburg, Mass., which received a new 4-place 47J-2 Ranger for personnel transportation between plants. . . . **MISSISSIPPI VALLEY HELICOPTERS, INC.,** St. Louis, has contracted to use a Bell 47J-2 Ranger in flying personnel and equipment in support of 17 Atlas missile sites and operations bases in Nebraska, during the next 14 months. . . . **FIRST COMPLETELY AUTOMATIC CONTROL SYSTEMS IN HELICOPTER AIRLINERS** will be Lear L-5H autopilots and command instrument systems to be installed by Lear, Inc. in a fleet of twin-turbine Boeing-Vertol V-107 25-passenger copters to be operated by New York Airways. . . . **OFFICIAL ALTITUDE OF 26,369 FEET BY A U. S. AIR FORCE H43B HUSKIE HELICOPTER** beats a Russian-held world record by nearly 1,900 ft., according to Kaman Aircraft, manufacturers of the Huskie.

SOUTHERN AIRWAYS has purchased 5 Martin 404 transports as the initial step in re-equipping its fleet, now consisting of DC-3's. . . . **NORTH CENTRAL AIRLINES** has contracted to purchase from Frontier Airlines three route segments in Montana, North Dakota and South Dakota totaling 1,376 route miles connecting 16 cities. Price was not disclosed. . . . **ALLEGHENY AIRLINES** is retiring its DC-3 fleet after adding a fifth jet-prop Convair 540. Make-up of the new fleet includes 5 Convair 540's, 8 Convair 440's and 16 Martin 202's and 202A's. One DC-3 will be retained temporarily. . . . **ALLEGHENY AIRLINES** has acquired a 50% interest in National Car Rental System, which operates over 12,000 autos. . . . **PACIFIC AIR LINES** has announced a public offering of stock.

WINGTIP AUXILIARY FUEL TANKS FOR 1961 PIPER COMANCHE have been licensed with FAA approval by Brittain Industries, Inc., 463 N. Prairie Ave., Hawthorne, California. Dr. Karl Frudenfeld, Brittain president, said the 15-gal. tanks are easily installed by A & E mechanics without jigs. Total installation weight of the tip tanks is 24 lbs. They sell for $995 as a kit.

Airmen's Calendar

Aug. 23-25—Lawyer-Pilots Association's 3rd Annual Meeting, Dell View Hotel, Wisconsin Dells.

Aug. 24-26—OX5 Club National Convention, Allis Hotel, Wichita, Kansas.

Aug. 26-27—Ohio Fly-In, Beaver Island, Michigan.

Sept. 4-10—Annual Flying Display & Exhibition, Farnborough, England.

Sept. 5-Oct. 6—2nd Annual Aerial Applicator Short Course, Ohio State University, Columbus, Ohio.

Sept. 6-9—Canadian Business Aircraft Association's Annual Convention, Toronto.

Sept. 10-12—National Aeronautic Association Annual Convention, Westbury, N. Y.

Sept. 11-15—8th Annual Postgraduate Course in Aviation Medicine, Ohio State University Health Center, Columbus, Ohio.

Sept. 13-14—Airwork's International Operations and Maintenance Symposium, Millville, N. J.

Sept. 14-17—4th Annual Ruby Hunt Rendezvous & Mountain Jamboree, Florida Air Pilots Association; Chairman, Robert Mulgrew, 1510 Moffett St., Hollywood, Fla.

Sept. 15-17—National Association of State Aviation Officials Annual Convention, Miami.

Sept. 17—6th Annual Jaycees Show with Bill Sweet's National Championship Air Show, Midland, Texas.

Sept. 20-24—Air Force Association's National Convention and Aerospace Panorama, Philadelphia.

Sept. 26-28—National Business Aircraft Association Annual Convention, Mayo Hotel, Tulsa.

Oct. 3-5—1961 National Airports Conference, University of Oklahoma, Norman, Okla.

Oct. 4-6—National Association of Air Traffic Specialists First Annual Meeting, Oklahoma City.

Oct. 7-14—13th Annual All-Texas Air Tour, Details from Texas Air Tours, 307 Walton Bldg., Austin, Tex.

Oct. 8-10—25th Annual Convention, International Aviation Council, Davenport Hotel, Spokane, Wash.

Oct. 9-11—Airport Operators Council Mid-Year Conference, Hilton Hotel, El Paso.

Nov. 1-2—Mooney Aircraft's Annual Distributors Meeting, Kerrville, Tex.

MAINTENANCE SCHOOL FOR NEW ARC NAV-COM EQUIPMENT, conducted by Aircraft Radio Corporation, Boonton, N. J., recently graduated representatives from Bell Helicopter Co., Boeing-Vertol, Kaman Aircraft, de Havilland Aircraft of Canada, the Marines and Air Force.

NEW CHANCE VOUGHT F8U-2NE is all-weather version of the Navy's Crusader interceptor, equipped with larger high-performance radar. The new Crusader is equipped with the Pratt & Whitney J-57-P-20 engine, four Sidewinders, Vought-designed autopilot system, long-range search radar and has greater speed and altitude capabilities. Main exterior recognition feature is enlarged nose section for bigger radar.

New Business In The Hangar

REMMERT-WERNER, INC., Lambert Field, St. Louis, has delivered to Naegele Advertising Company a new deluxe executive CV300 Convair with CB16 engines, square exhaust augmentors for speed and quieter operation, long-range wing fuel tanks, rear entrance, Bendix X-band radar, Collins radar transponder, Sperry autopilot and Gyrosyn compass, Collins 17L7-51X2 communications, ARC-210 standby VHF, dual Collins 51X2 omni with dual Collins 51V3 glideslope and 51Z2 3-light marker, dual Sperry R1 pictorial deviation indicator and H6 electric gyro horizon, dual Bendix ADF with iron core loops, Bendix ignition analyzer, isolation amplifier and other features. Dan Colburn is pilot. . . . New deluxe interior was installed in Neil Fulton's Olin Industries Fairchild F-27. . . . Frank Farley's Emhart Manufacturing DC-3 had a new interior and Sierracote heated windshield installed. . . . Monsanto Chemical has taken delivery of a second R-W Convair, equipped with Bendix X-band radar, Sperry autopilot, dual Collins 51R omni with RMI, dual Bendix ADF, ARC-210, custom instrument and radio panels, square exhaust augmentors and executive interior. Ralph Piper is chief pilot. . . . Latest R-W CV300 executive Convair is being operated by Pet Milk Company. It has CA18 engines, long-range tanks, square augmentors, flight crew desk and chair, radar, dual Collins omni with RMI, dual ADF, Collins 17L-51X VHF communications, ARC-21 standby communications, MHF transceiver, dual Bendix Omni Mags, Sperry Gyrosyn compass, isolation amplifier and other features.

ON MARK ENGINEERING COMPANY, Van Nuys, California, had Kenlyn Petroleum's B-26 in for custom interior, engine change and work on aux tanks. . . . Farah Manufacturing's B-26 received fuel tank work, canopy rework and relicensing. . . . S. A. Camp Ginning's B-26 came in for routine maintenance, new tires and repairs to radio and autopilot. . . . . Three of new full-headroom and pressurized Marksmen are under construction for delivery this fall, according to William H. Boone, manager of product sales. . . . Also in the hangar last month were Wheaton Glass's pressurized Marksman, a Phillips Petroleum Lodestar, a Shell Oil de Havilland Dove and one of AJ Tankers' North American AJ-1 borate-bomber fire fighters.

EXECUTIVE AIRCRAFT SERVICE, Red Bird Airport and Love Field, Dallas, performed wing modifications on William H. Bush's Hughes Tool DC-3. . . . Ed Armstrong's S. W. Richardson Estate DC-3 received airframe and engine repairs. . . . Interior repaint and modifications were performed on Nelson Rokes' Procter & Gamble Grumman Gulfstream. . . . Also in for work were John Henry's Vincent & Welch Beech 18, Jesse Reese's Atlantic Refining Beech G18 from Caracas, Venezuela, Paul Deats' Helms Express Beech 18 and Martin Weirauch's Chemical Lodestar.

AIRESEARCH AVIATION SERVICE, Los Angeles International Airport, delivered to Joe McClure, aviation manager of IBM, that firm's new Fairchild F-27 with custom interior, radio and electronics installations, super soundproofing and exterior painting. . . . Mead Johnson's chief pilot, Jack Jones, took delivery of a DC-3 after extensive refurbishing of the interior with furniture and appointments more homelike than wing-type. It also received installations of a Sperry A12 autopilot, Adkins anti-collision lights and exterior painting. . . . Walt Pager brought in Pratt & Whitney's Convair 340 for complete interior refurbishing, installation of transponder, Collins integrated flight system. Collins 17L7-51X2 communications, application of service bulletins and exterior painting. . . . Lou Ramey and Andy Soska brought in Consolidated Coal's B-23 for recover of control surfaces, landing gear overhaul, interior items, ex-

COMPARE

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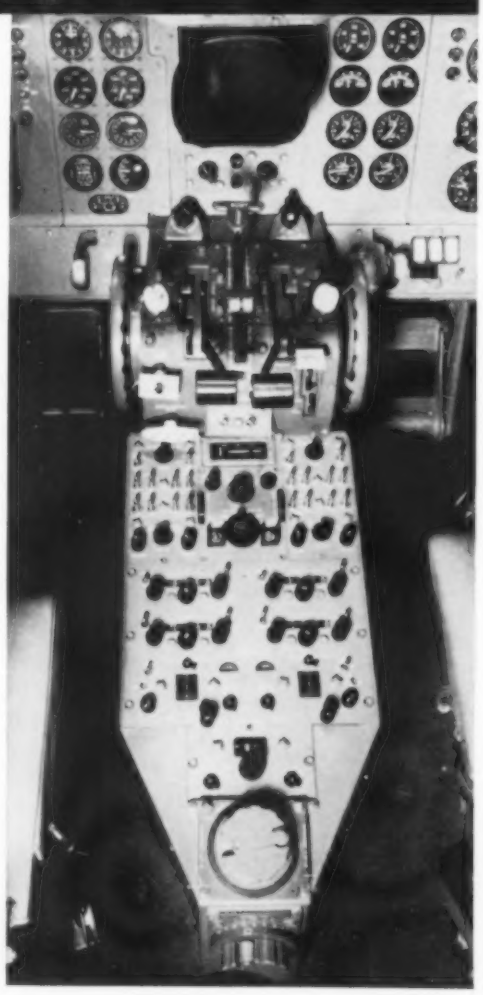

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San Antonio, Texas

Champ's Aviation, Inc.
Municipal Airport
El Paso and Lubbock, Texas

Clinton Aviation Company
Stapleton Airfield
Denver, Colorado

Coastal Aviation, Inc.
4906 Tampa Bay Blvd.
Tampa International Airport
Tampa 3, Florida

Cruse Aviation, Inc.
International Airport
Houston, Texas

Executive Aircraft Company
701 Perimeter Road
Kansas City, Missouri

Lynch Flying Service, Inc.
Logan Field Box 1575
Billings, Montana

Macon Air Service, Inc.
P. O. Box 2036
Macon, Ga.

Ragsdale Aviation, Inc.
Municipal Airport
Austin, Texas

Southwestern Skyways, Inc.
Municipal Airport
Santa Fe, New Mexico
and Ogden, Utah

Sunny South Aircraft Service, Inc.
Broward International Airport
Fort Lauderdale, Florida

Walston Aviation, Inc.
Civic Memorial Airport
East Alton, Illinois

Wings, Inc.
Wings Field
Philadelphia 18, Pa.

Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

terior painting and other work. . . . D. C. (Buck) Newton and Bob Middleby brought in their Pittsburgh Plate Glass DC-3 for wing removal and inspection, installation new-type Pittsburgh Plate Glass electrically-heated windshields, and radio service work. . . . Also in for work were Jim Nieukirk's Firestone Lodestar and W. W. Bartlett's Gibbons & Reed Aero Commander.

FOUR NEW LOCKHEED JETSTARS are scheduled to be fitted out by AiResearch Aviation Service for executive operations when deliveries of the 500-mph., 4-jet business transport begin in September. They have been ordered by Ford Motor, Continental Oil, Superior Oil, and the Eaton Co. of Toronto. In preparation for these and other JetStars, AiResearch constructed a full-scale cabin mockup equipped with a custom interior authentic to the smallest detail, thus gaining specialized JetStar experience and creating a "demonstrator" for potential customers.

MAXWELL BALFOUR, long with the firm, has been named president of Spartan Aircraft Co., Tulsa.

SOUTHWEST AIRMOTIVE, Love Field, Dallas, is converting and testing GE J79-GE-5A jets to the latest Dash 5B configuration under a USAF contract affecting over 100 engines at a cost of about $400,000. These engines power the Convair B-58 Hustler supersonic bomber.

PACAERO, Santa Monica, is installing custom interiors and radio-electronic equipment in three 8-place Italian-manufactured Piaggio P-166 twin-engine transports acquired by Northrop Aircraft for corporate use. This new Piaggio may eventually be assembled and sold in quantities in the U. S. More than 40 P-166's have been delivered to business firms outside of the U. S. by Piaggio.

DALLAS AERO SERVICE, Love Field, Dallas, performed 12,000-hr. overhaul on a Central Airlines DC-3. . . . Bob Dodson's British American Oil Lodestar received landing gear overhaul, tank repair, exterior paint and other work. . . . Flap and tail modifications and other work were performed on Floyd Graham's Carrier Corp. Lodestar. . . . De-icer boots and vacuum system were installed on George May's D. Harold Byrd Lodestar, which also was repainted. . . . Also in the shop were J. W. Denson's Cardinal Drilling Lodestar, Don Nelson's Murphy Corp. Lodestar and Pan American Sulphur's Lodestar.

NORMAN LARSON'S PLANE-SERVICE DIVISION, Van Nuys, installed one of the first Narco DME's in Elmer Hehr's Twin-Bonanza. . . . Dr. Thomas Drummond's North American P-51 had a Narco Mark X installed — Dr. Drummond uses his P-51 for fast transportation to and from medical conventions. . . . High-speed landing gear door kit was installed on a Bonanza for Hans de Schultess and a fuel injection kit was installed on Dr. Glenn Fagg's H Model Bonanza.

GENE BOWEN has been promoted to vice president and general manager of Huntair, Inc., Cessna dealership at San Diego, California, according to L. W. Hunt, president of Air-Oasis Co. Bowen joined Air-Oasis at Long Beach three years ago. He began flying at Bloomington, Illinois, was in the Air Force Ferry Command and has airline, executive and light aircraft sales experience.

BAY AVIATION SERVICES COMPANY, San Francisco International Airport, delivered a Super V Twin to Dr. and Mrs. James T. Harkness in time for them to fly to the American Medical Association convention in New York. Its complete custom equipment includes the following: 3 each Collins

THIS IS THE ONLY VIBRATION-PROOF AIRCRAFT BATTERY IN THE WORLD. EXECUTIVE BONDING, EXCLUSIVE WITH REBAT, ELIMINATES PLATE DESTROYING VIBRATION, A MAJOR CAUSE OF BATTERY FAILURE. ONE MORE REASON WHY REBAT EXECUTIVE IS THE WORLD'S LARGEST SELLING AIRCRAFT BATTERY.

THE ELECTRIC AUTOLITE COMPANY, TOLEDO 1, OHIO

NEW-CONCEPT FLIGHT DIRECTOR by Vecto Instrument Corp., Houston, provides natural-sensing gyro horizon indications directly related to exact aircraft attitudes in roll, pitch and turn. It covers 230 degrees of roll and 90 degrees of pitch. Known as the Vector Gyro SD2307, it is marketed through Vecto distributors for less than $400.

51X3 VHF receivers, 2 each Collins 17L-8A VHF transmitters, 2 each Collins 344D-1 omni converter indicators, 3 each Collins 427B-2 modulator power supplies, Lear ADF, Narco marker receiver.

CAPITOL AVIATION, Springfield, Ill., performed interior refurbishing in one of Ross Bennett's Sangamo Electric Learstars. . . . L-2 autopilot and 50-amp generators were installed on Bert McDonald's Illinois State Highway Department Cessna 310C.

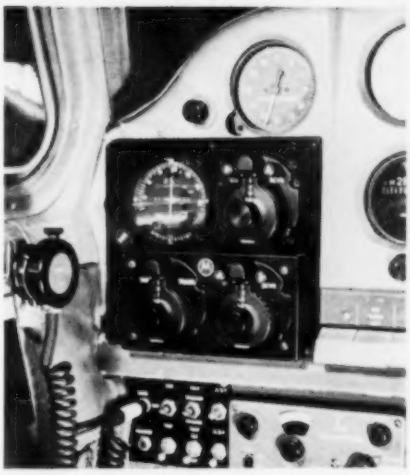
CALIFORNIA AIRMOTIVE, North Hollywood, delivered National Brewers' Convair 240 after installation of autopilot, radar, navigation electronics, overhaul and repainting. . . . Four Martin 202A's were sold to Allegheny Airlines.

MRS. DOT LEMON of Hollywood, California, long-prominent woman pilot, was elected president of the Institute of Navigation during the organization's recent annual meeting. Mrs. Lemon was in her teens when she learned to fly more than 30 years ago, becoming a barnstormer, aircraft saleswoman, racing pilot, flight school operator, meteorologist and aviation management executive. When she obtained her Master's degree in meteorology, her graduation thesis on air mass analysis was widely reprinted in textbooks.

QUALITRON AERO, Burbank, had Orlin Sorenson's Signal Oil & Gas DC-3 for exterior paint, interior refurbishing and landing gear overhaul. . . . Bill Cloes brought in his Consolidated Western Steel Lodestar for interior modifications and electronic equipment servicing. . . . A Collins DMET system was installed in Tommy Mayson's W. H. Keck, Jr. Grumman Gulfstream from Houston. . . . Also in the shops were John Kendall's Food Machinery Lodestar, George Fleming's Sears Roebuck DC-3 and Judd Kunkel's Shell Oil de Havilland Dove.

DR. DORA DOUGHERTY, a member of Bell Helicopter Company's Human Factors section and one of the world's few women aviation psychologists, has been named 1961 winner of the Lady Hay Drummond-Hay Memorial Trophy, given annually by the N. Y. Branch of the Women's International Association of Aeronautics. Dr. Dougherty early this year set two world helicopter records. Licensed for both rotary-wing and fixed-wing aircraft, she holds the sixth airline transport and commercial pilot's license ever awarded a woman in this country.

UNITED AIR LINES SAN FRANCISCO MAINTENANCE BASE has developed an analog computer for rapid testing of autopilots. Whereas static testing of malfunctioning autopilots formerly took up to 8 hrs., the new computer, which duplicates physical movements of an aircraft in flight, permits dynamic testing in 30 minutes or less.



NEW MOTOROLA PANEL IN BONANZA, installed by Flight Electronics of Westchester County Airport, White Plains, N. Y., for James Loeb's Air Taxi Company of Redbank, N. J., groups new M-135 Navcom system in a small package. Frank Langner of Flight Electronics has installed the system in 11 Air Taxi Co. airplanes.

KAMAN AIRCRAFT CORPORATION, Bloomfield, Conn., is erecting a $500,000 flight service facility at Bradley Field, AirKaman, flight service subsidiary of the helicopter company, was successful bidder among nine companies and individuals seeking a contract from the state as fixed-base operator at Bradley Field. Pilots and owners of executive and private

TWENTY-EIGHTH NATIONAL SOARING CHAMPIONSHIPS of the Soaring Society of America were scheduled for August 1-10 at Municipal Airport, Wichita, Kansas, with approximately 50 sailplanes competing. Picture shows a new Cessna 175 used as official tow plane. Among competitors were Dick Johnson of Arlington, Tex., 5-time winner; Dick Schreder, Toledo, twice national champion, and Harland Ross of Wichita in his new R-6. Paul Bikle, SSA president and world altitude holder, was also compting.

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aircraft will be provided a pilot lounge and flight planning room on a round-the-clock, 7-days-a-week basis for complete aircraft sales, service and repair. Twin-engine Convair and F-27-type aircraft can be housed in the new service hangar.

RICHARD A. (DICK) HENSON, for many years chief of flight test at Fairchild Stratos Corporation's plant at Hagerstown, Maryland, has been named program director for Fairchild's F-27 turboprop transport aircraft program. Henson will be responsible for F-27 improvements, production and sales. F-27's are being manufactured at a rate of one a month.

READING AVIATION SERVICE, Reading, Pa., performed partial new interior, exterior paint and aileron recover on Ray Higgans' Sun Oil DC-3. . . . An East Coast Aviation DC-3 was in for P & W 1830-94 conversion, geared rudder tab installation, Ceconite rudder covering, partial interior rework and increased seating capacity. . . . New radio-electronics equipment and custom radio panel were installed in Bill Morgan's Penn Airways Aero Commander, including dual ARC omni, ARC-210, ARC-21 ADF, Dare glideslope, Narco marker receiver, Collins 618F transceiver and Flitronics amplifier.

PIEDMONT AVIATION, Winston-Salem, repainted Herb Drew's R. J. Reynolds Tobacco Fairchild F-27. . . . Also in for work were Robert Carney's Pennsylvania Railroad DC-3, Dale Balzer's Chatham Manufacturing DC-3, Karl Styne's Noland Company Fairchild F-27, C. W. Nelms, Jr.'s Campbell Soup DC-3 and Grady Adams' Smith Transfer Beech E18S.

HOWARD AERO SERVICE, San Antonio, received Robert M. Stone's Life & Casualty Insurance Lodestar for Howard 250 conversion. . . . Curley McCraw's Odessa Natural Gasoline Lodestar is getting extensive Howard 250 modifications. . . . Bill Powell's Russell Firestone, Jr. Lodestar received Howard landing gear doors and new paint. . . . Howard landing gear doors were installed on Johnny Bouteller's Service Pipe Line Lodestar. . . . Autopilot and instrument repairs were made on Stan Siggins' Plymouth Oil Super Ventura. . . . Drag strut anchor modification was performed on Henry Messer's Dumas Milner Mark II Super Ventura.

RICHARD C. VOGEL has been named manager of Cessna Aircraft Company's East Coast branch with offices at Morristown, New Jersey. Frank Martin, Cessna marketing division manager, said Vogel will be responsible for appointing and servicing Cessna dealers in the Eastern U. S. Vogel joined Cessna in 1953 and has recently been regional sales manager for the Southwest.

AVIATION POWER SUPPLY, INC., Burbank, is overhauling a Pratt & Whitney R-985 and modifying it to an R-985-APS-4 configuration with 12 to 1 blower impeller ratio for Steve Peters' P & E Construction Beech D18S. . . . Other engine work is under way for Sears, Roebuck's DC-3, North American Aviation's DC-3 and Colorado Interstate Gas Company's Daco B-26.

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JET POWER TRENDS

(Continued from page 27)

ness flying.

The CJ610-2B Turbojet, which produces 2,400 lbs. of thrust. Two of these engines will power the 500-mph. Swiss American Aircraft Corp. SAAC-23 "Execujet," a 6-place, twin-jet business aircraft sponsored by William P. Lear, Sr.

The typical twin-jet business aircraft powered by CJ610 turbojets will offer the following:

Aircraft weight, 9,000-15,000 lbs.

Passengers, 4 to 8.

Speed, 500 to 550 mph.

Range, 1,500 to 2,000 nautical miles (1,700 to 2,300 statute miles).

Altitude capability, 25,000 to 45,000 ft.

Runway take-off distance, 1,800 to 2,400 ft.

The CF700-2B Turbofan. This power plant consists of the CJ610 basic engine plus an aft fan. It produces 4,200 lbs. of thrust. It is intended to power twin and 4-engine aircraft in the 16,000-50,000-lb. class, with increased range and good short-field performance through turbofan design.

The typical 2-4-engine turbofan-powered business aircraft utilizing CF-700-2B aft-fan jets will offer the following:

Aircraft weight, 16,500-50,000 lbs.

Passengers, 8 to 12.

Speed, 500 to 550 mph.

Range, 1,500 to 3,000 nautical miles (1,700 to 3,400 statute miles).

Altitude capability, 25,000 to 45,000 ft.

Runway take-off distance, 2,000 to 4,000 ft.

We have seen the military gas turbine speeds progress from subsonic to transsonic and finally to supersonic levels in both fighters and bombers. Consider now what the future trend might be in business and commercial aircraft, for here the characteristics are somewhat different.

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The future, through the late 1960's and beyond, will see the perpetuation of this trend as it spirals downward to include the less-than-quarter-million-dollar and less-than-12,500-lb.-gross-weight aircraft. The speed and altitude capability of these smaller airplanes, powered by gas turbines, will closely approach the performance of those which preceded them in the trend to gas turbines.

Such, then, is the shape of the gas turbine trend, which will see the turbine power plant emerge as the primary source of power for future business and executive aircraft.

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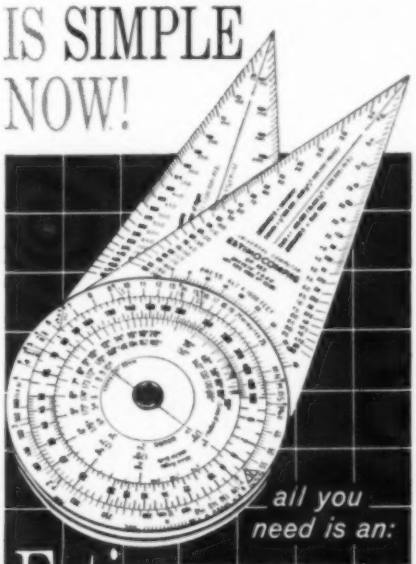

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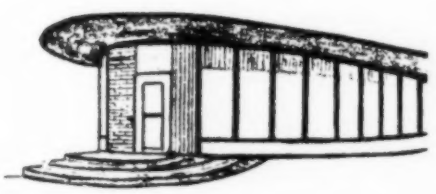

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